Oct. 7, 1952 W. P. THIELENS 2,612,737

METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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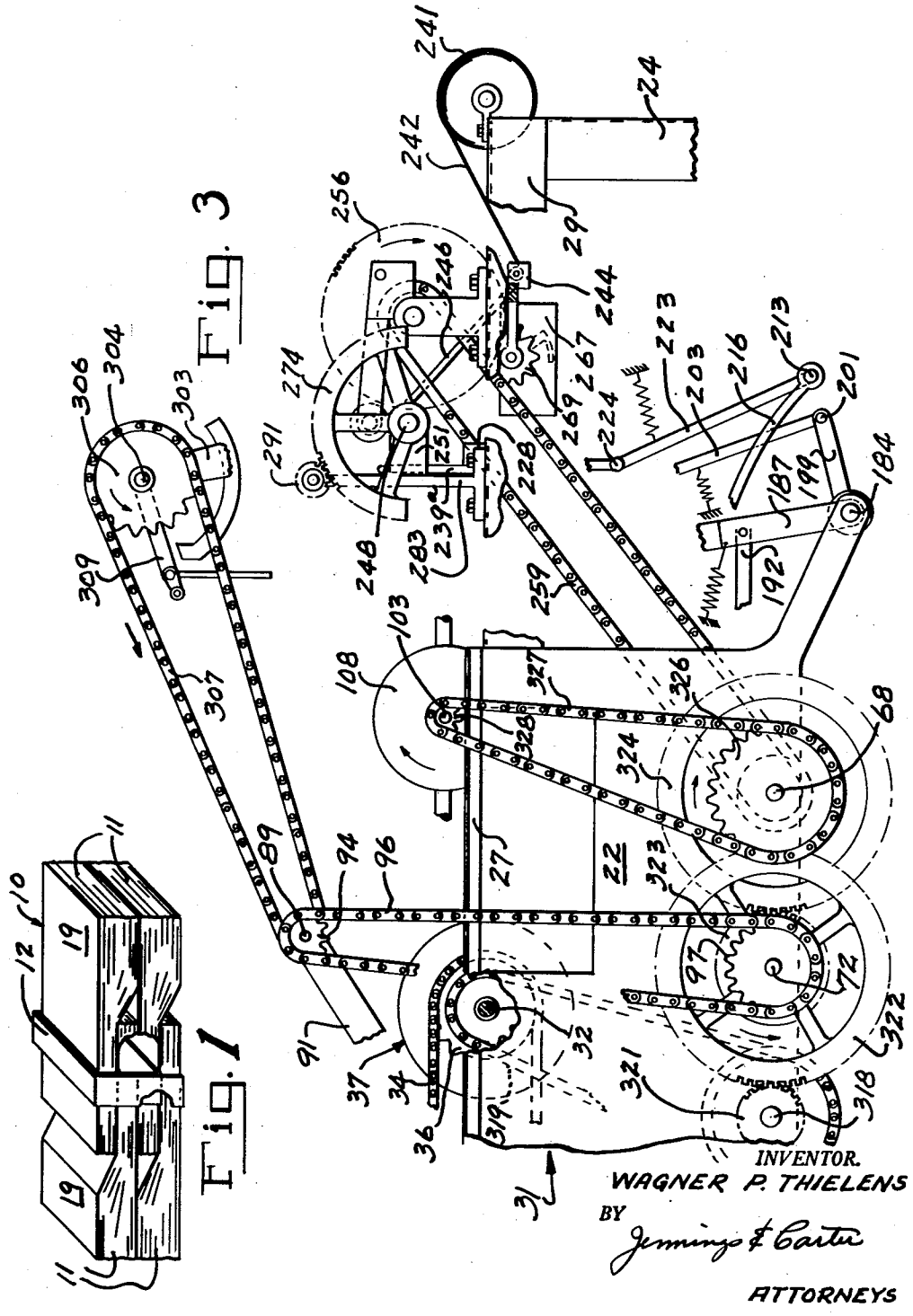


Fig. 3

Fig. 1

INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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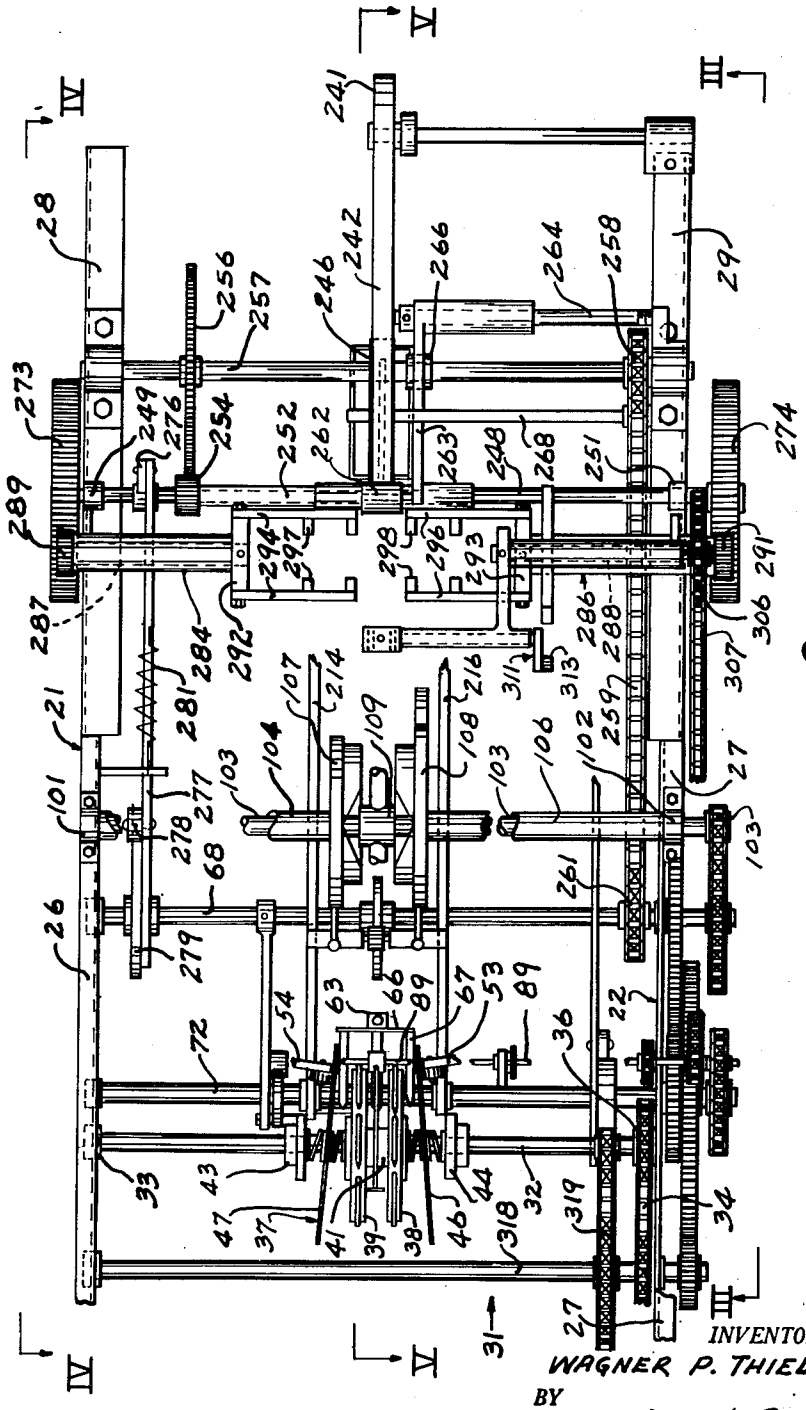


Fig. 2

INVENTOR.
WAGNER P. THIELENS
BY
Jenning & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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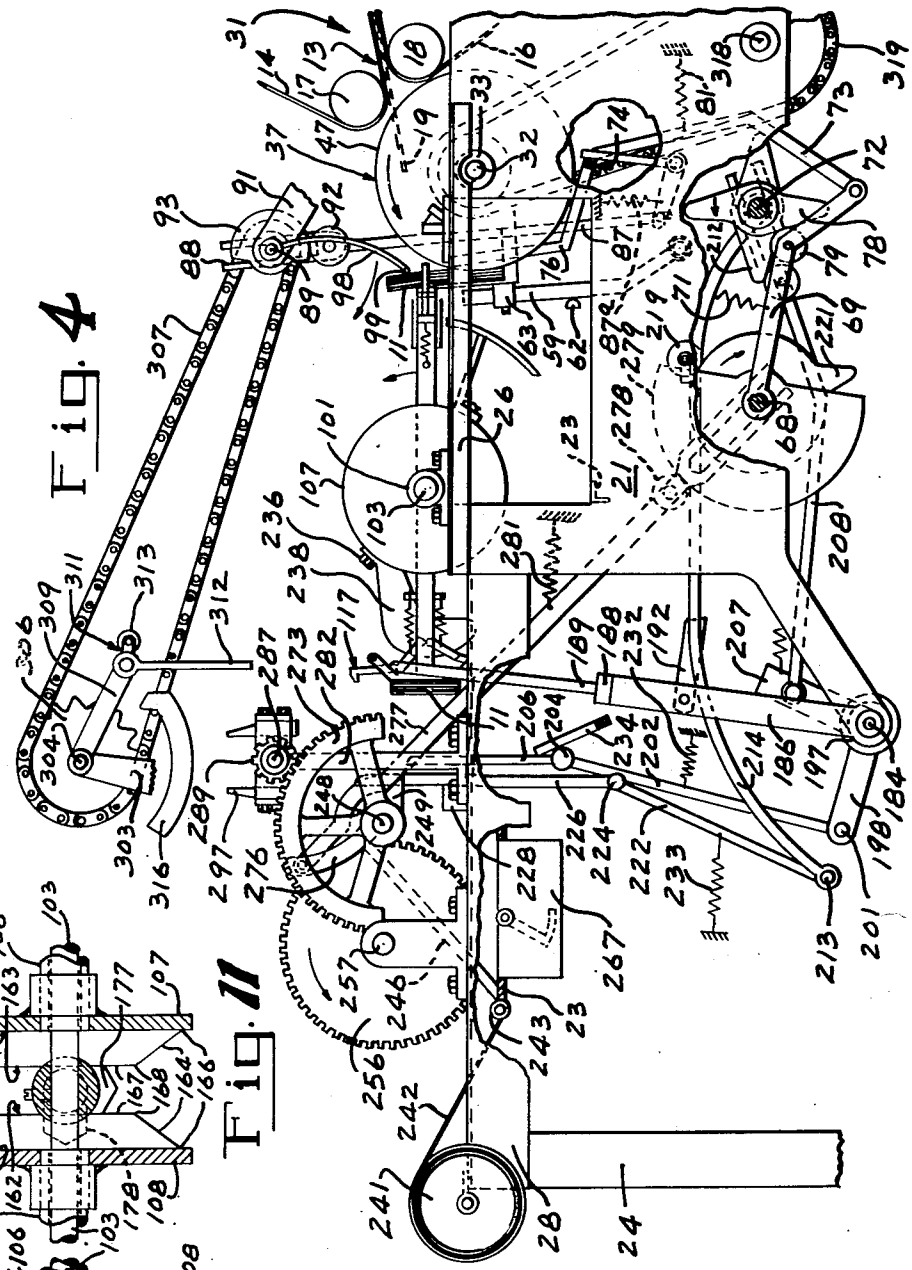


Fig. 4

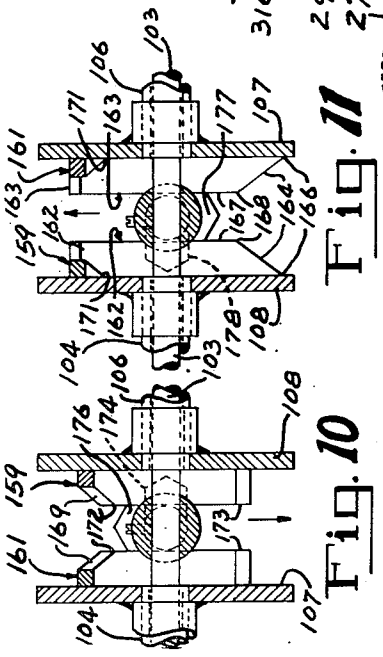


Fig. 11

Fig. 10

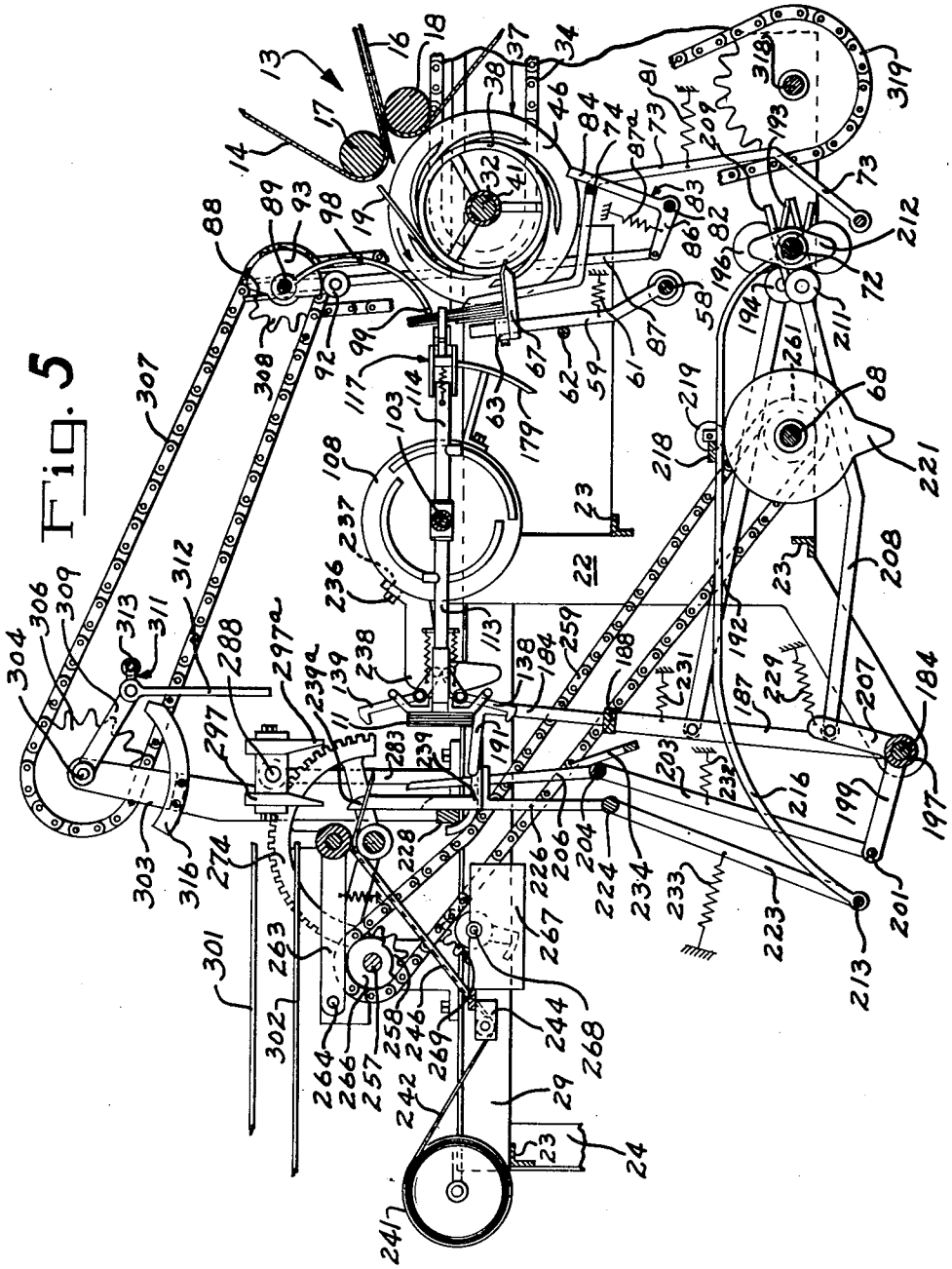
INVENTOR.
WAGNER P. THIELENS
BY Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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Fig. 5



INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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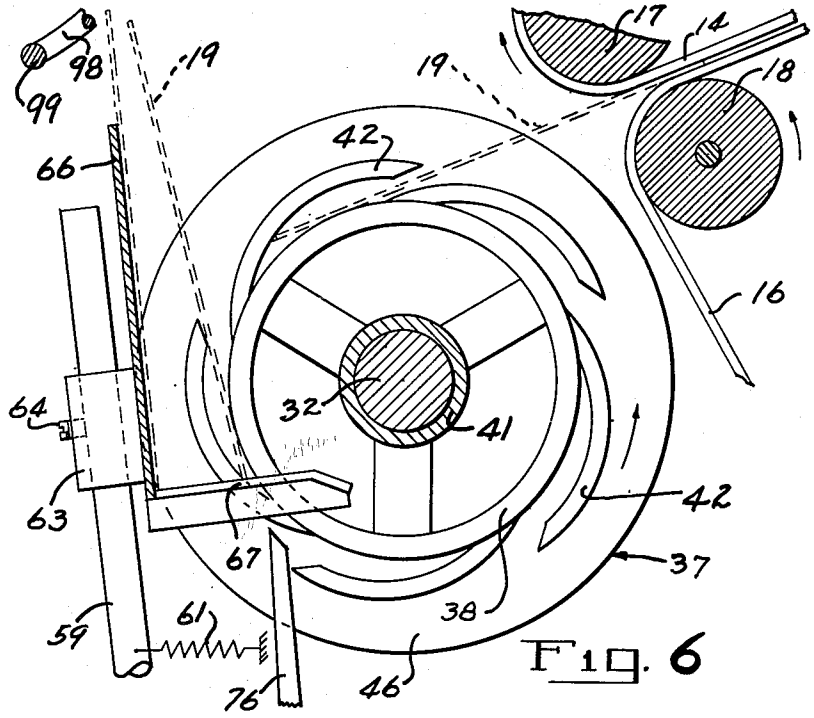


Fig. 6

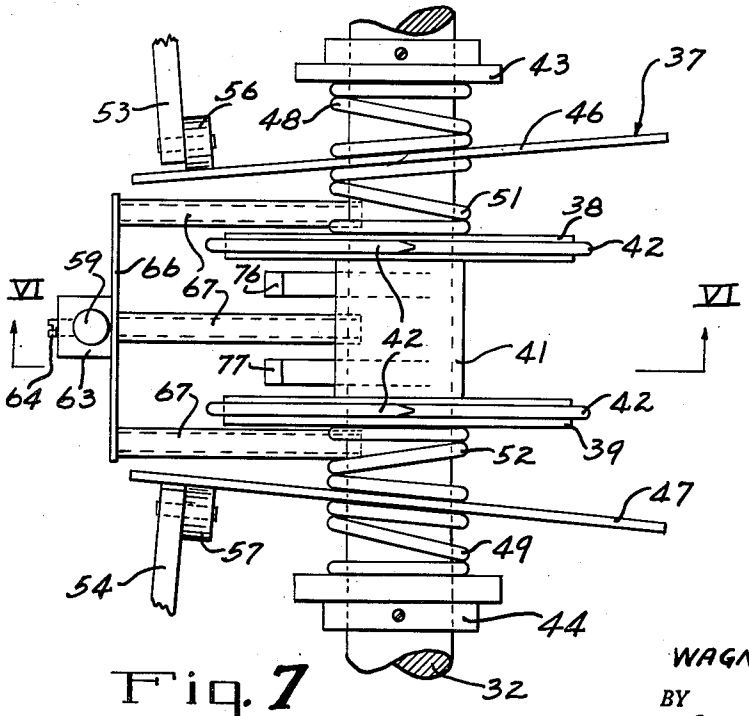


Fig. 7

INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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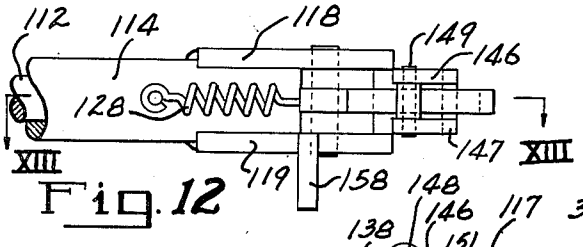


Fig. 12

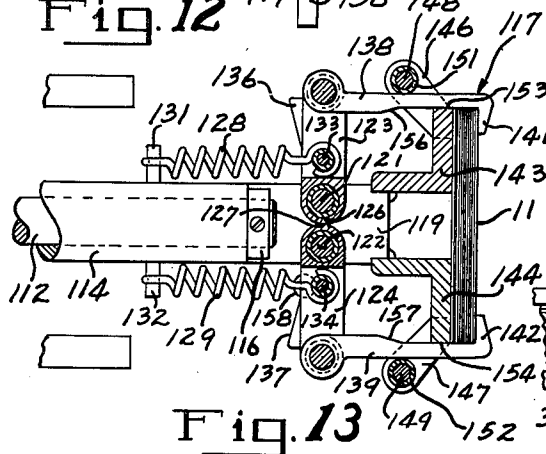


Fig. 13

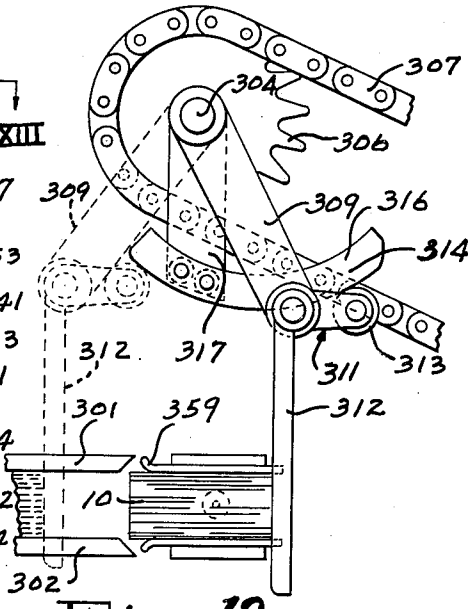


Fig. 18

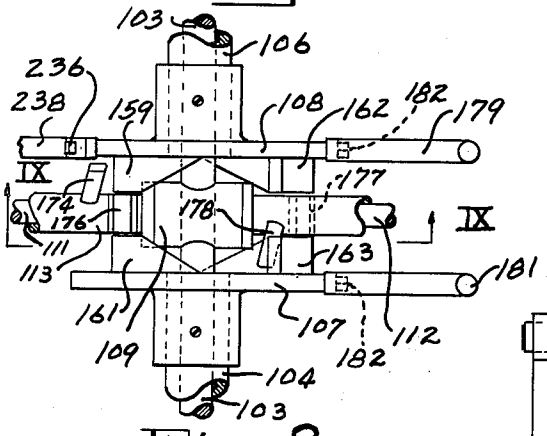


Fig. 8

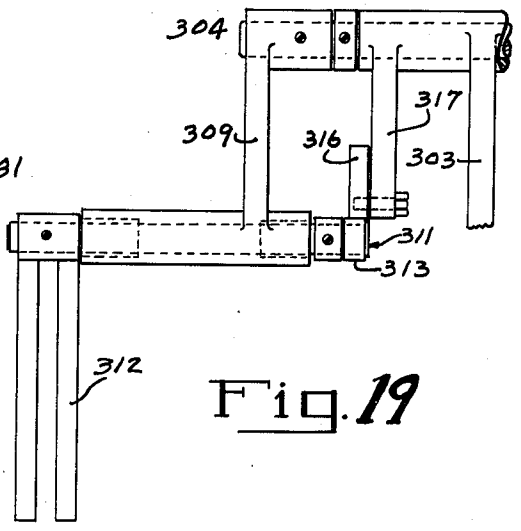


Fig. 19

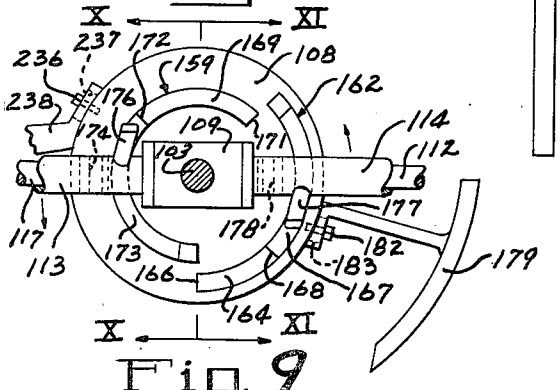


Fig. 9

INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

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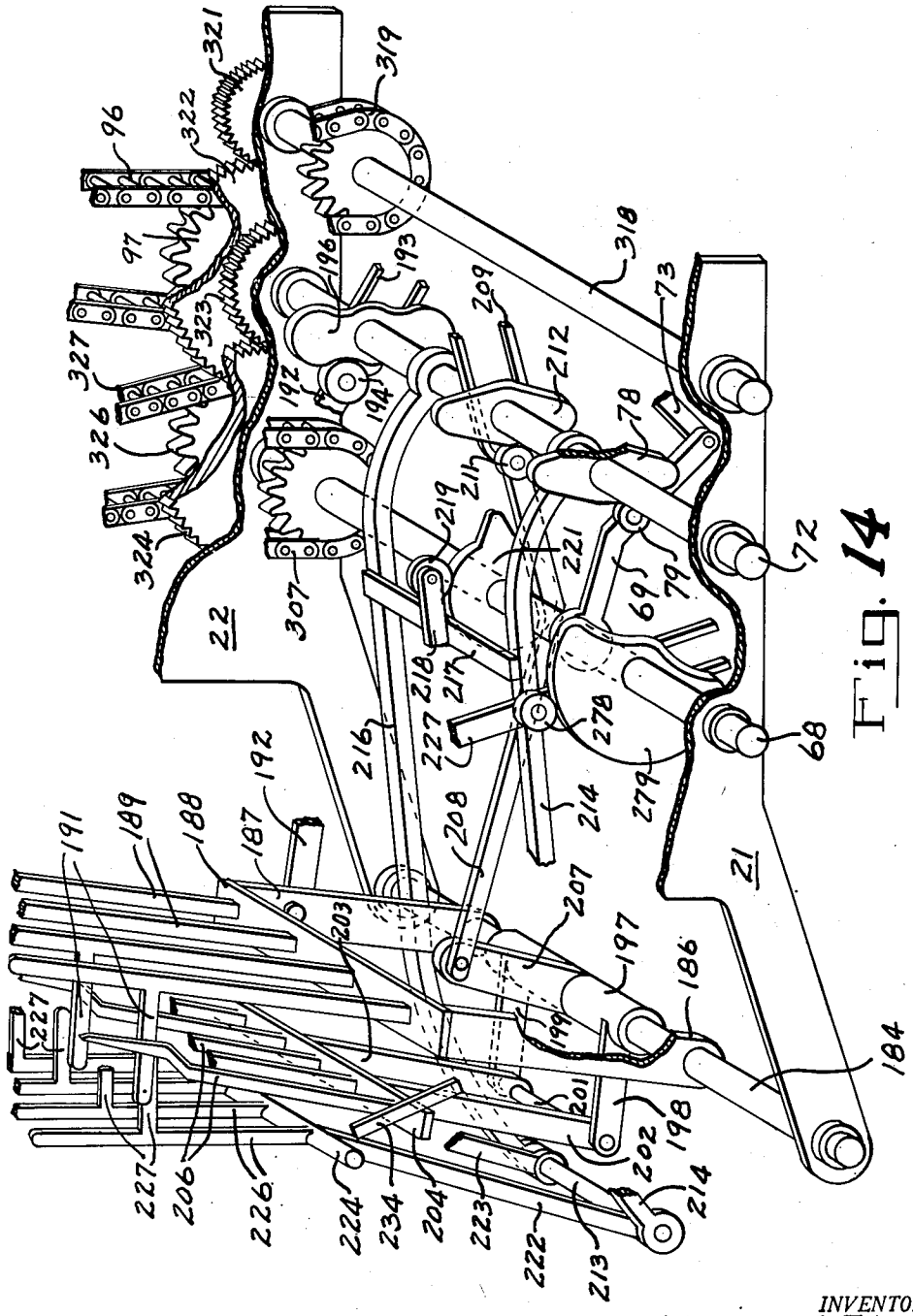


Fig. 14

INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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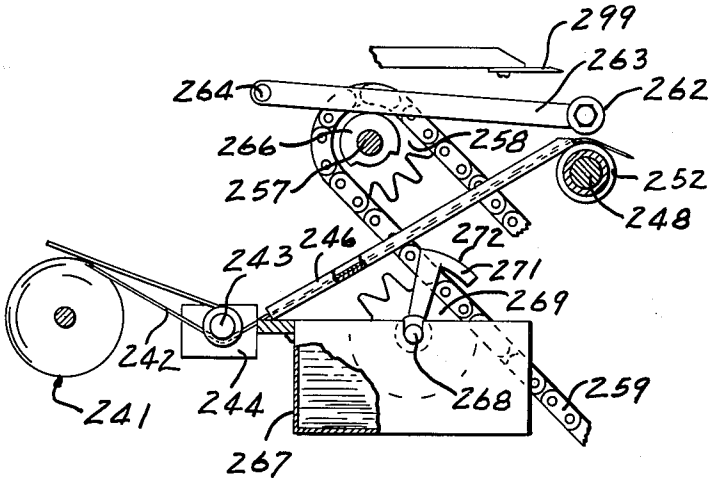


Fig. 16

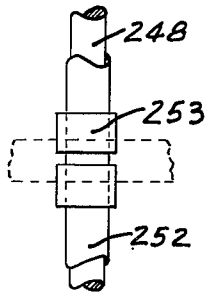


Fig. 17

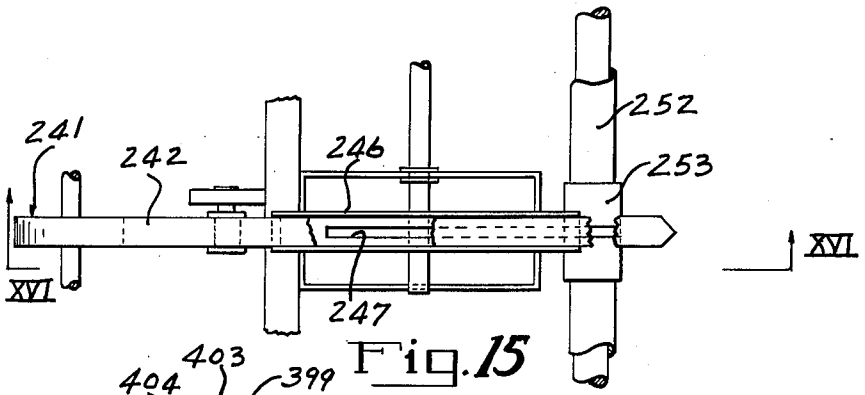


Fig. 15

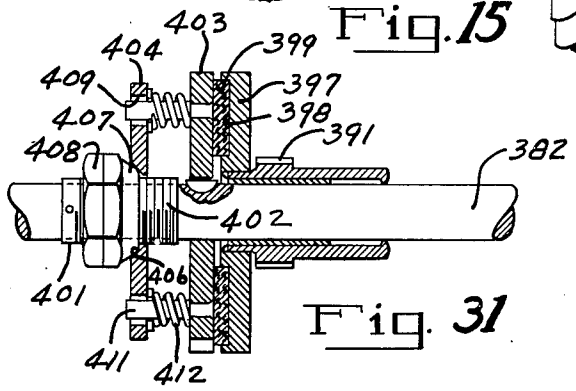


Fig. 31

INVENTOR.
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BY Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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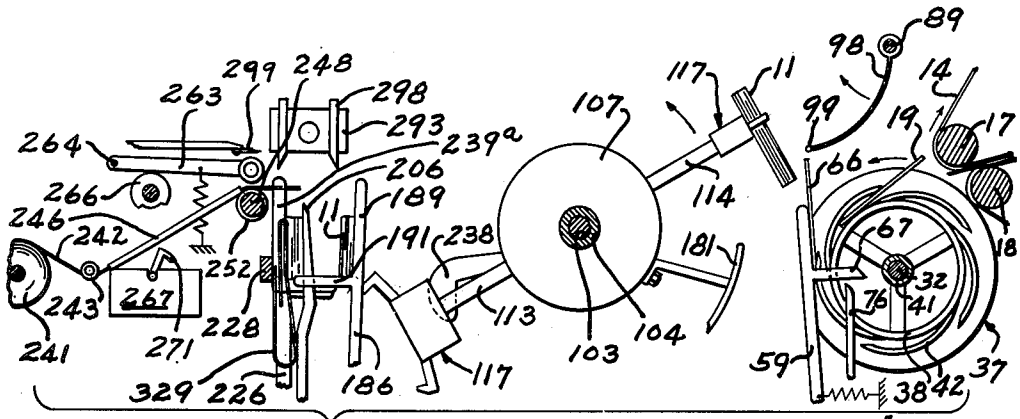


Fig. 20

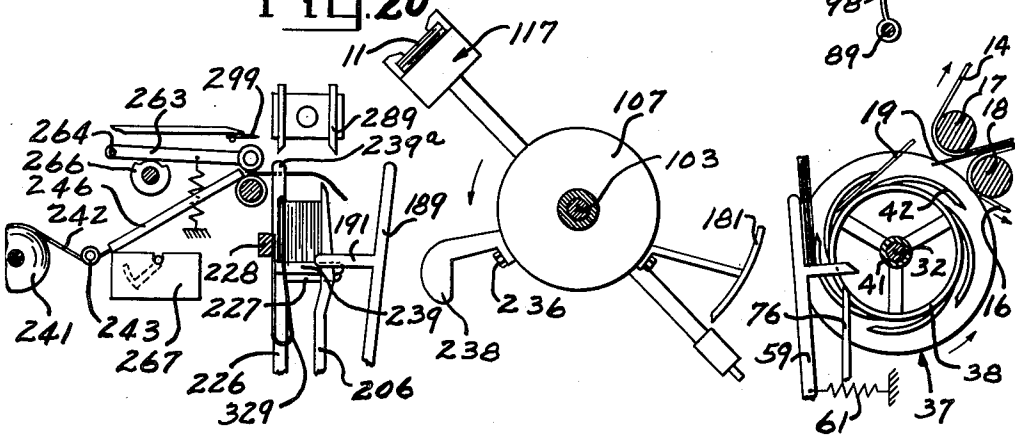
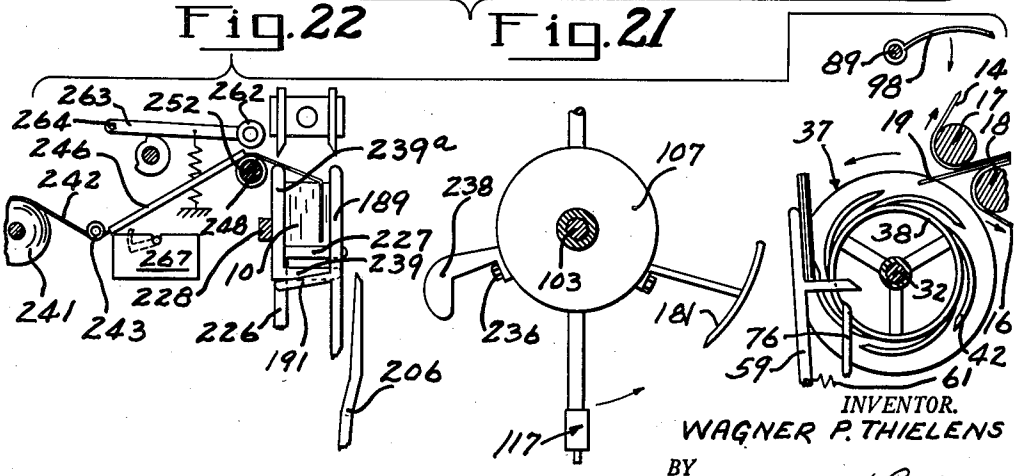


Fig. 22

Fig. 21



INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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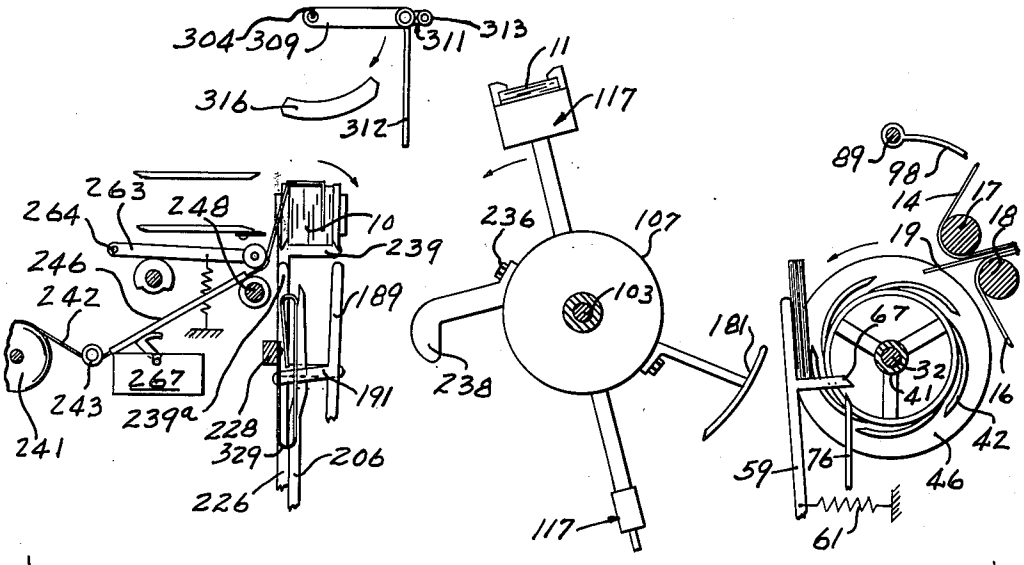


Fig. 23

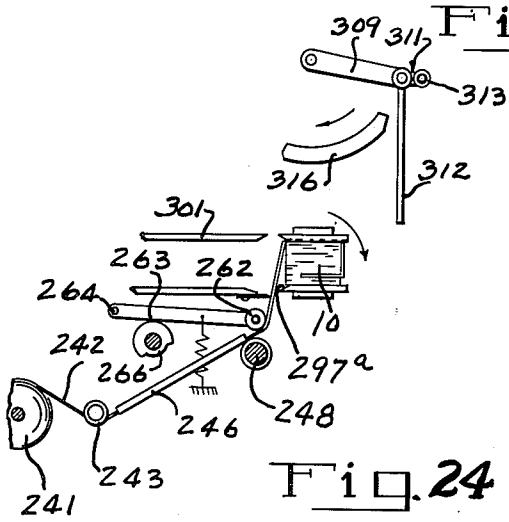


Fig. 24

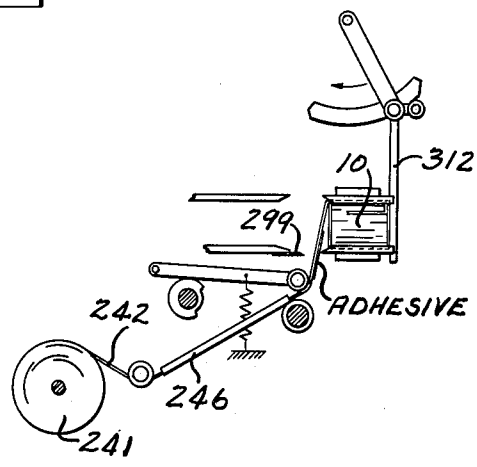


Fig. 25

INVENTOR.
WAGNER P. THIELENS

BY Jennings & Carter

ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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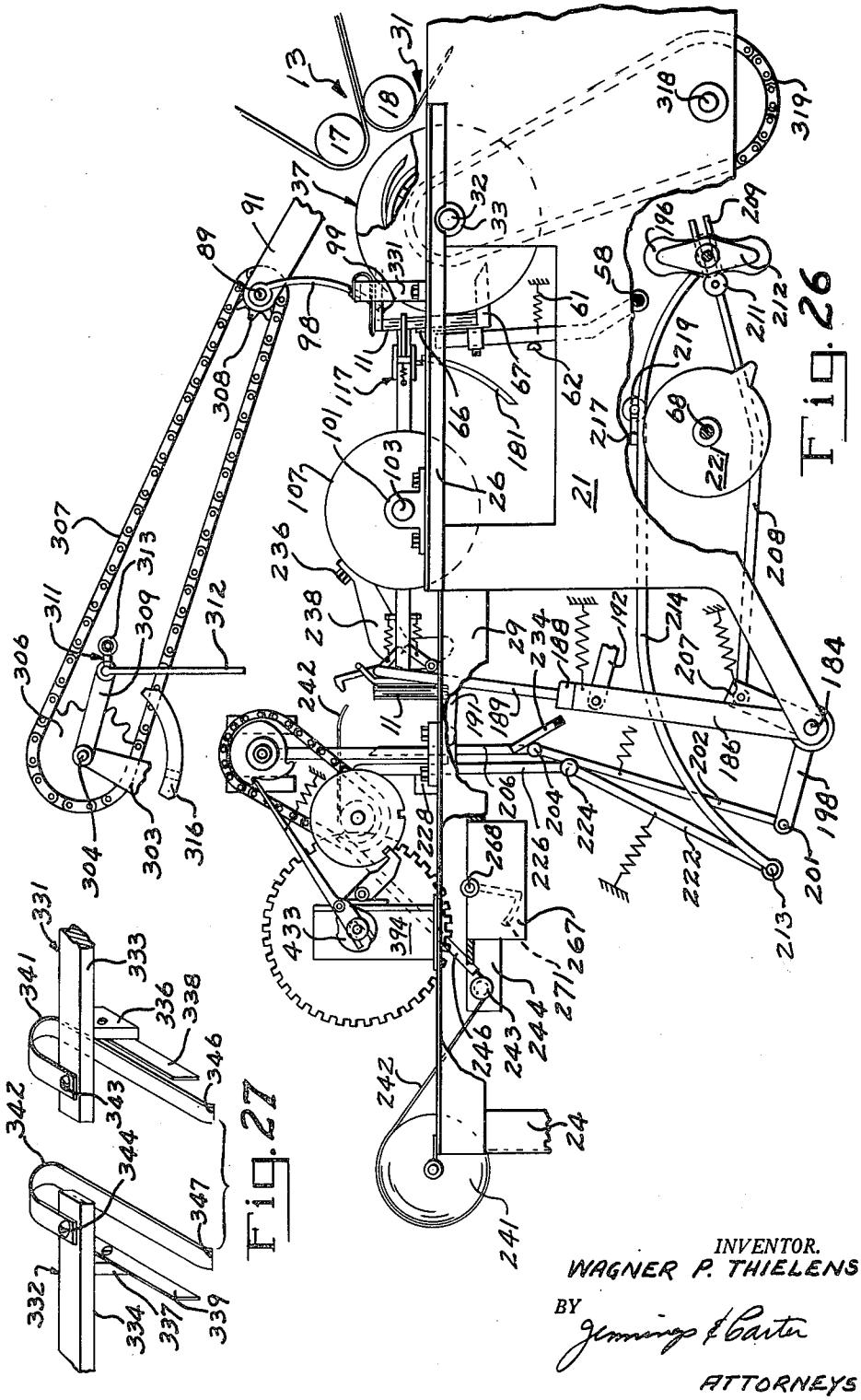


Fig. 26

Fig. 27

INVENTOR.
WAGNER P. THIELENS
BY Jennings & Carter
ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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Fig. 29

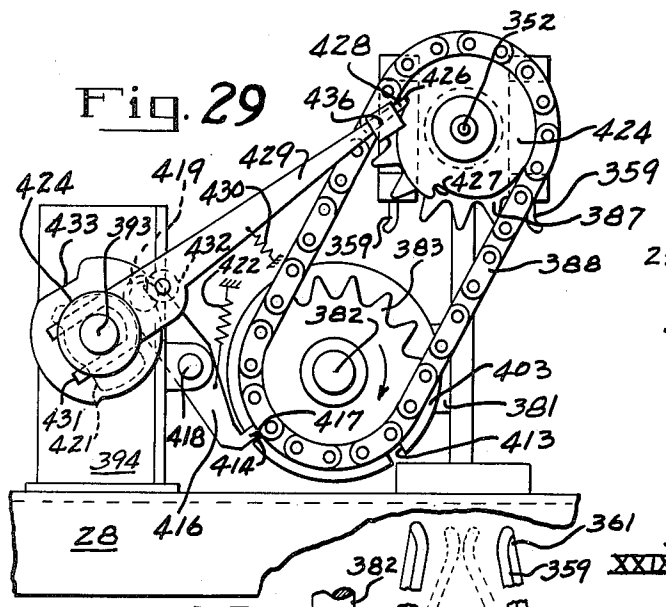


Fig. 28

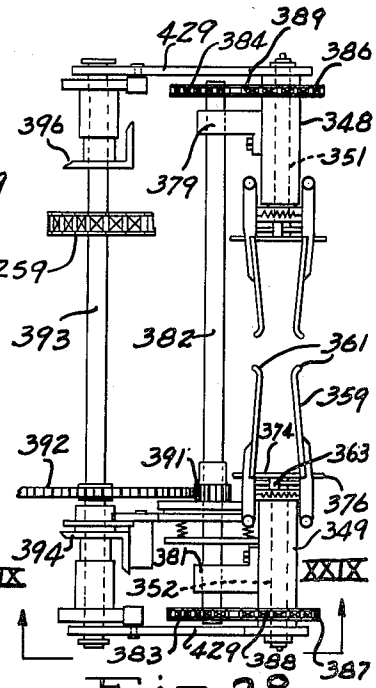


Fig. 30

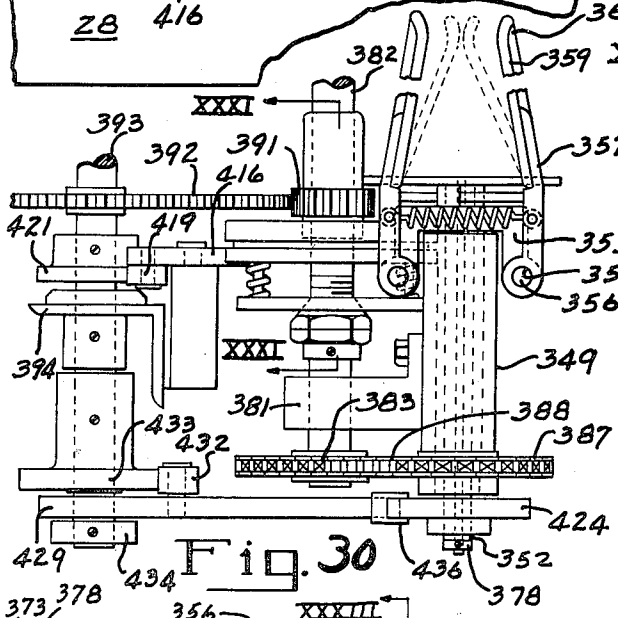


Fig. 33

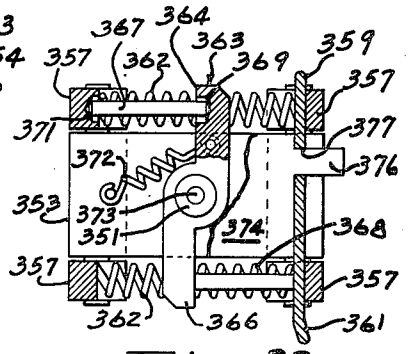
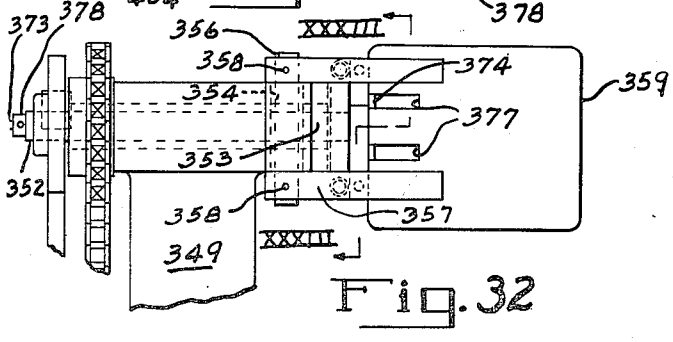


Fig. 32



INVENTOR.
WAGNER P. THIELENS

BY Jennings & Carter

ATTORNEYS

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METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

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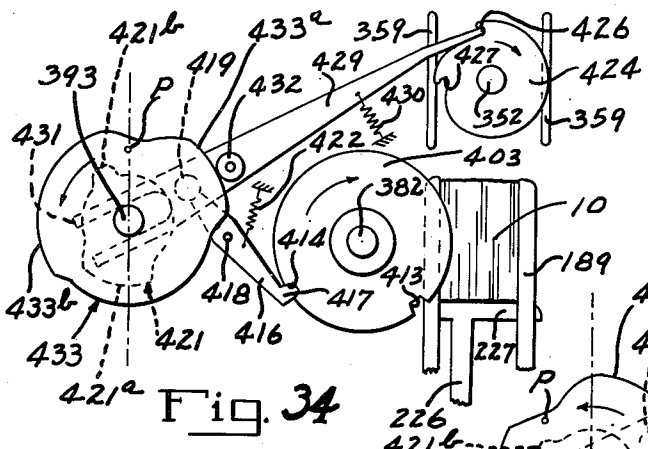


Fig. 34

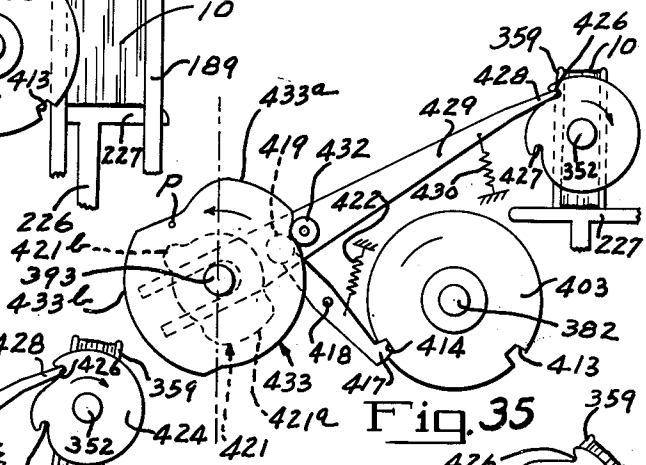


Fig. 35

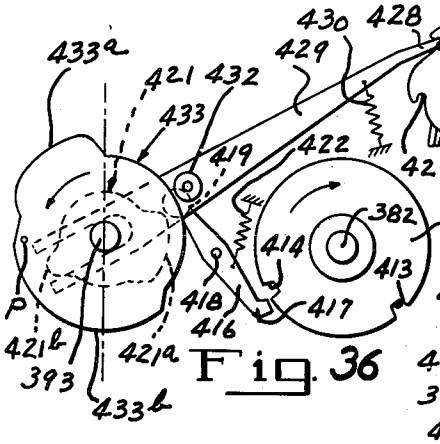


Fig. 36

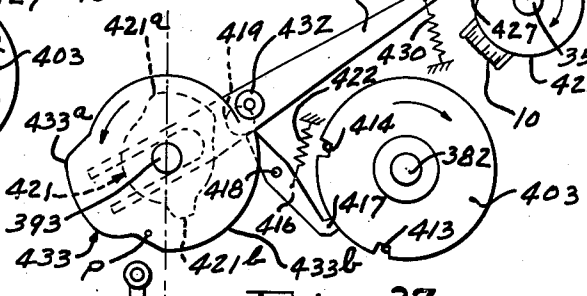


Fig. 37

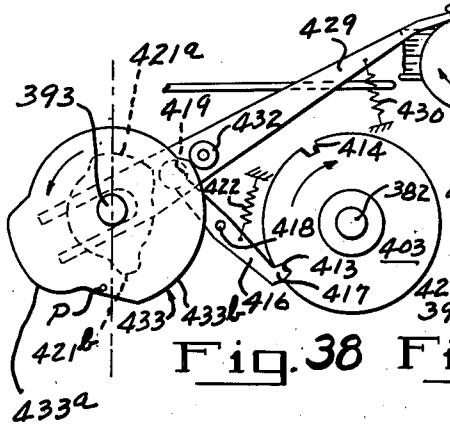


Fig. 38

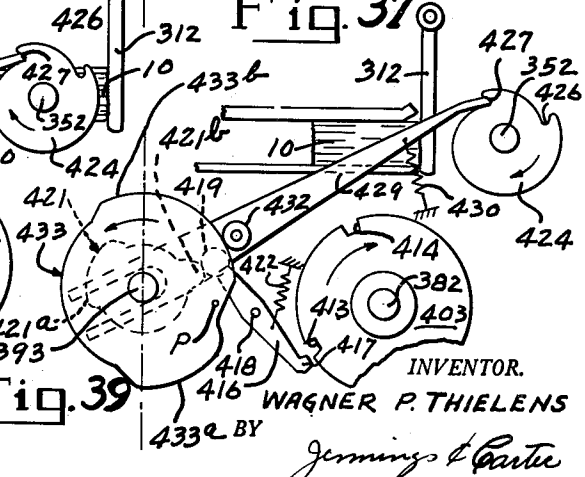


Fig. 39

INVENTOR.
WAGNER P. THIELENS
BY
Jennings & Carter
ATTORNEYS

Patented Oct. 7, 1952

2,612,737

UNITED STATES PATENT OFFICE

2,612,737

METHOD AND APPARATUS FOR PACKAGING PAPER BAGS AND THE LIKE

Wagner P. Thielens, Tuscaloosa, Ala., assignor to Gulf States Paper Corporation, a corporation of Delaware

Application February 25, 1949, Serial No. 78,402

42 Claims. (Cl. 53—7)

1

My present invention relates to a method and apparatus for forming paper bags and the like into packages, and while not limited thereto, to a method and apparatus by which paper bags are packaged as they are delivered from a high speed bag making machine.

In the art to which my invention relates, paper bags are generally made on automatic machines in a continuous process. In some cases the bags are delivered from the bag making machine in upright position, that is, with the bottoms down, and with the bottoms folded flat against the sides of the bags. Present day bag making machines are capable of making and delivering approximately 1500 small bags (one pound bags) per minute, and proportionately smaller numbers of larger bags. The bags are delivered one at a time from the discharge end of the bag machine, and one of the prior methods of assembling the same comprises feeding them from the bag making machine into a trough-like receiver, from whence they are manually removed, bunched, and tied. Some machines are equipped with automatic counting devices operable to cause every 50th or the like bag to be raised above the general level of the remainder in the trough, thus aiding the operator in counting the bags to form packages of equal number. The packaging operation therefore consists in an operator manually removing from the trough a given number of groups of bags and binding them by tying a string or the like around the groups, thus to form a package. This manual operation is very slow and fatiguing, and has necessitated the slowing down of the bag machines to around 500 small bags per minute, or in effect to about one-third the actual capacity of the machines. In the manufacture of medium and large size bags, the machines heretofore have been operated at considerably slower output speeds than the actual capacity because of the difficulty and slowness of prior methods of assembling the bags into packages.

It is the prime object of my invention to overcome the above difficulties, thereby to provide a method and apparatus for forming bags into packages especially adapted for use in connection with high speed bag making machines, and fully effective to permit the bag making machine to be operated at its maximum capacity.

My invention contemplates the method of forming individual bags into packages which comprises assembling a predetermined number of bags into sub-groups or units, and then periodically and in timed regularity with the receipt of bags from the bag making machine delivering

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these groups to a package forming station where they are placed side by side with the bottoms of the bags of adjacent groups disposed at opposite ends of the package, thus providing a substantially rectangular package which lends itself to economical, space saving packaging for shipping purposes.

Another object is to provide a method of the character designated in which the bags are rotated while being transferred from the point of assembly of the groups to the package assembly station, whereby upon arrival at the latter station the groups are ready for assembly with the bottoms alternately disposed, thus saving time in the transfer process, and preventing the necessity of shifting or rehandling the groups after arrival at the packaging station.

Another object is to provide a method of the character designated in which bags to be packaged are first formed into groups comprising a given number of individual bags and in which a plurality of the groups are assembled with the tops of the bags thereof overlapping, and then in securing the package intermediate its ends by wrapping therearound a length of paper tape or the like.

Another object is to provide apparatus for receiving bags from a bag machine and having means for counting and assembling the bags into sub-groups, a rotary transfer mechanism for placing the groups in a package assembly mechanism with the bottoms of the bags of adjacent groups lying at opposite ends of the package, together with mechanism disposed to receive and rotate the assembled package thereby to wrap a length of tape or other material thereabout to secure the package.

Another object is to provide apparatus of the character designated in which the several motions are timed with respect to delivery of bags from the bag machine, and timed with respect to each other whereby the bags are received, divided into sub-groups, transferred to the package assembly station, formed into a package, and the package wrapped and ejected all as sequential steps in a continuous process, and to accomplish these operations with relatively slowly moving component parts forming the complete apparatus.

A further object is to provide apparatus of the character designated in which the mechanism for transferring the sub-groups to the package assembly mechanism is also operable to rotate successive packages alternately to obtain the particular form of package above mentioned.

Further objects are to provide mechanism for

separating the bags into sub-groups as they are delivered to my improved apparatus which shall accomplish the separating operation without interrupting the delivery of bags from the bag making machine; to provide rotary mechanism for transferring the groups of bags from the group assembly mechanism to the package assembly mechanism which embodies spring biased cam actuated grippers adapted to releasably grip the group of bags at each side, thus to assure alignment of the bags while in transit and their proper placement in the package assembly mechanism; to provide a group holding and package compressing mechanism operable to prevent the bags from being displaced from the package assembly mechanism during assembly of the package; to provide mechanism for automatically feeding the securing tape over the package in position to be wrapped therearound upon rotation of the package; and to provide a rotatable package receiving mechanism operable to wind the tape thereabout and come to rest with the package in position for ejection by a suitable mechanism.

My improved method and apparatus is illustrated in the accompanying drawings forming a part of this application in which:

Fig. 1 is a perspective view of a package of paper bags formed in accordance with my inproved method and which may be formed on my improved apparatus;

Fig. 2 is a plan view, partly broken away and in section and with parts omitted for the sake of clarity;

Fig. 3 is a side elevational view, partly broken away and looking in the direction of the arrows III—III of Fig. 2;

Fig. 4 is a fragmental side elevational view, partly broken away, and looking in the direction of arrows IV—IV of Fig. 2;

Fig. 5 is a longitudinal sectional view taken generally along the line V—V of Fig. 2 and illustrating the various parts in an intermediate position in the formation of a package of bags;

Fig. 6 is an enlarged sectional view through the vane wheel and portions of the bag group assembling mechanism, taken generally along line VI—VI of Fig. 7;

Fig. 7 is a plan view of the mechanism shown in Fig. 6;

Fig. 8 is a fragmental plan view of the bag group transfer actuating mechanism;

Fig. 9 is a detail sectional view on line IX—IX of Fig. 8;

Figs. 10 and 11 are detail sectional views taken on the respective lines indicated on Fig. 9;

Fig. 12 is a fragmental side elevational view of one of the bag group pickup mechanisms;

Fig. 13 is a detail sectional view taken on line XIII—XIII of Fig. 12;

Fig. 14 is a somewhat diagrammatic, fragmental perspective view of the bag group assembling and raising mechanism and of the drive shafts, gears and cams for this mechanism and other parts of the apparatus;

Fig. 15 is a fragmental plan view of the band feeding mechanism;

Fig. 16 is a detail sectional view taken along line XVI—XVI of Fig. 15;

Fig. 17 is a detail view of the driven band feeding roller;

Fig. 18 is a detail side elevational view of the package ejecting mechanism;

Fig. 19 is a fragmental front elevational view of part of the mechanism shown in Fig. 18;

Figs. 20 to 25 inclusive are diagrammatic views illustrating the operation of the apparatus;

Fig. 26 is a view corresponding to Fig. 4 and showing modified mechanisms for forming the bags into groups and for rotating the assembled package to wrap the tape thereabout;

Fig. 27 is a detail perspective view of the spring fingers for aligning and holding the bags while in the group assembling mechanism shown in Fig. 26;

Fig. 28 is a fragmental plan view of a portion of the modified package receiving and rotating mechanism therefor;

Fig. 29 is an end view of the apparatus shown in Fig. 28 as viewed along line XXIX—XXIX of Fig. 28;

Fig. 30 is an enlarged plan view of the clutch jaw releasing and driving mechanism for the modified package wrapping mechanism shown in Fig. 28;

Fig. 31 is a detail sectional view taken along line XXXI—XXXI of Fig. 30;

Fig 32 is a front elevational view of one of the rotatable jaws and associated mechanisms of the apparatus shown in Fig. 28;

Fig. 33 is a detail sectional view taken along line XXXIII—XXXIII of Fig. 32; and,

Figs. 34 to 39 inclusive are diagrammatic views illustrating the operation of the modified package receiver, clutch mechanism, and package ejector.

Referring now to the drawings for a better understanding of my invention, and more particularly to Fig. 1, I show a complete package of bags 10 formed of four sub-groups or units 11, of individual bags. The bottoms of the sub-groups are turned alternately to lie at opposite ends of the package and the tops of the bags overlap as indicated and are secured by a length of tape 12 wrapped thereabout. It is to be noted that the thick double portions forming the bottoms of the bags overhang the tops of the adjacent subgroup, whereby the package is substantially rectangular in shape. Such a package lends itself conveniently to further packing for shipment, and the bags may be quite readily inspected by an operator "fanning" the bottoms thereof between the thumb and forefinger of one hand, while holding the package in the other. After inspecting the bottoms of two of the groups, the package may be rotated in the hand and the bottoms of the other groups may be likewise fanned for inspection.

For the purpose of describing my improved method and apparatus, I will assume herein that it is desired to form a package containing 100 bags, and that four sub-groups will be employed to form the package. Each sub-group will thus contain twenty five bags.

Referring now more particularly to Figs. 2, 3, 4 and 5, my improved apparatus is shown in association with the discharge end 13 of the usual bag making machine, the remaining portions of the bag making machine being omitted since it forms no part of the present invention. In the manner understood, the discharge end of the bag making machine comprises a pair of belts 14 and 16 mounted on rollers 17 and 18 between which the individual bags 19 are delivered. The bags 19 thus emerge in timed regularity from between the belts 14 and 16.

My improved apparatus embodies a frame comprising side plates 21 and 22 suitably braced and held in spaced relation by means of a suitable number of cross braces 23, many of which

are omitted in the drawings for the sake of clarity. The entire framework is supported on legs 24 which may rest on the floor of the building in which the apparatus is housed. The tops of the plates 21 and 22 carry angles 26 and 27 adjacent the forward end of the apparatus, and other angles 28 and 29 project rearwardly from the ends of the plates 21 and 22, thereby to provide means for supporting the bearings for the various cross shafts and other mechanisms as will be presently described.

Adjacent the forward end 31 of the apparatus is rotatably mounted a cross shaft 32, journaled in suitable bearings 33 carried by the angles 26 and 27. The shaft 32 is rotated in timed relation with respect to the bag making machine through a chain 34, passing over a sprocket 36 on the shaft 32, and over a driven sprocket on the bag making machine, not shown.

Mounted on the shaft 32 intermediate its ends is a vane wheel 37 corresponding substantially to the type of vane wheel now used in connection with some bag making machines. As best shown in Figs. 6 and 7 the vane wheel comprises a pair of spoked wheels 38 and 39 held spaced apart by means of a sleeve 41, and both mounted fixedly on the shaft 32 for rotation therewith. The vane wheel rotates in the direction indicated by the arrows on the several views. On the periphery of each wheel 38 I provide curved fingers 42 opening rearwardly in the direction of rotation of the vane wheel, thereby to provide pockets for receiving the bottoms of the bags as they are delivered from between the belts 14 and 16. It will be understood that the vane wheel rotates in timed relation with the belts 14 and 16 and the delivery of the bags 19 therebetween so that a set of the fingers 42 is positioned to receive a bag each time one is delivered from between the belts.

Fixedly mounted on the shaft 32 are collars 43 and 44. Mounted loosely on the shaft 32, adjacent the wheels 38 and 39 are discs 46 and 47. Interposed between the discs 46 and 47 and the collars 43 and 44 are compression springs 48 and 49, and on the opposite sides of the discs between the collars and the wheels are similar coil springs 51 and 52. The collars 43 and 44 are adjusted axially along the shaft whereby the discs 46 and 47 are compressively engaged between the springs.

Mounted rearwardly of the discs 46 and 47, on arms 53 and 54 suitably secured to the frame work of the apparatus are rollers 56 and 57. The rollers engage the periphery of the discs 46 and 47 whereby the periphery of the discs on the rear side of the vane wheel mechanism may be caused to converge, thereby to frictionally engage the sides of the bags as they are discharged from the vane wheel in the manner later to appear.

After being delivered to the vane wheel mechanism 37, the bags are discharged therefrom one at a time into a sub-package or unit assembly mechanism now to be described. As shown more clearly in Fig. 5, rotatably mounted in bearings on the inner sides of the plates 21 and 22 is a shaft 58. The shaft 58 is disposed rearwardly of and beneath the vane wheel mechanism 37, and has fixedly mounted thereon an upstanding arm 59. The arm 59 is biased forwardly toward the vane wheel by means of a spring 61, and is limited in its rearward movement by means of a stop 62 in the form of a rod connected at each end to the plates 21 and 22. Slidably mounted on the upper end of the arm 59 is a sleeve 63, held in adjusted position on the arm by means of a set screw 64. See particularly Figs. 6 and 7. Secured to the forward side of the sleeve 63 is an upstanding plate 66. Secured to the bottom of the plate 66 are a plurality of forwardly extending fingers 67. The plate 66 and its fingers 67 are disposed in position for the fingers 42 of the vane wheel to deliver the bags onto the fingers 67, plate 66 forming a backing member for holding the bags. Likewise, the plate and fingers are disposed to move toward and from the shaft 32 between the converging peripheries of the discs 46 and 47, whereby the bags are engaged along their edges by the discs 46 and 47 to prevent the same from bouncing upwardly responsive to hitting the fingers 67.

As before stated, it is an object of the present invention to assemble the bags into sub-groups comprising a predetermined number of bags. To this end, I provide mechanism operable after a predetermined number of bags have been deposited on the fingers 67 to enter immediately in front of the last bag forming the group, thus to prevent subsequently delivered bags becoming a part of the group. Referring more particularly to Figs. 4 and 5, I rotatably mount in suitable bearings carried by the plates 21 and 22 another cross shaft 68. Loosely mounted about the shaft 68 and extending forwardly therefrom is an angled arm 69, biased upwardly by means of a spring 71. The arm 69 extends forwardly beneath another rotatable cross shaft 72, and has pivotally connected thereto an arm 73. The arm 73 extends upwardly and forwardly for a distance, and thence is bent rearwardly slightly, and is provided adjacent its upper end with a cross member 74. Secured to the cross member 74 are upstanding separator fingers 76 and 77 (see also Figs. 6 and 7) which are disposed to enter between the bag receiving fingers 67 and between the wheels 38 and 39 of the vane wheel mechanism. As upward component of motion is imparted to the arm 73, and consequently the fingers 76 and 77, by means of a cam 78 on the shaft 72, and a follower roller 79 on the arm 69. The arm 73, and consequently the fingers 76 and 77 are biased forwardly by means of a spring 81.

Mounted on the plates 21 and 22 is a cross shaft 82. Mounted to rock about the shaft 82 is a crank arm 83, one leg 84 of which is disposed forwardly of and in contact with the cross member 74. The other arm 86 of the crank arm 83 has pivotally mounted thereto a vertically disposed link 87 biased upwardly by a spring 87a. The link 87 is slotted on its upper end as indicated at 88 and fits slidably about a shaft 89 journaled for rotation in inclined brackets 91, mounted on the framework. The link 87 carries a small roller 92 in contact with a cam 93 mounted on the shaft 89. As seen in Fig. 3, shaft 89 carries thereon a sprocket 94 over which passes a sprocket chain 96, in turn passing over a sprocket 97 on the shaft 72.

From a consideration of the construction just described it will be apparent that the arm 69 moves downwardly periodically responsive to the coaction of cam 78 and roller 79, thereby lowering the fingers 77 and 76, which it will be remembered are biased upwardly by spring 71 secured to arm 69. Likewise, the cam 93 moves the link 87 downwardly and holds the same in that position for approximately one-half of a revolution of the shaft 89, thus causing the arm 84 of the crank arm 83 to contact the cross member 74, thereby pushing the fingers 76 and 77 rearwardly. If the sub-units are each to contain 25 bags,

the shaft 72 rotates once for each 50 bags delivered since the cam 78 is a double-lobed cam, while the shaft 89 rotates once for each 25 bags delivered to the group assembly mechanism. Thus the fingers 76 and 77 are normally in raised position, projecting above the top of the fingers 67, and are spaced forwardly from plate 66. In this position the bags delivered from the vane wheel accumulate on the rearward side of the fingers 76 and 77, that is on the side toward the plate 66. After 25 bags have been delivered on the rear side of the fingers, the cam 93 causes the fingers to move rearwardly. This separates and positions a group of bags for removal by mechanism to be described, and holds them somewhat compressed against plate 66. During this time, additional bags to form a subsequent group are being deposited forwardly of fingers 76 and 77 on fingers 67. As soon as the group is removed cam 78 causes the fingers 76 and 77 to move downwardly below fingers 67, and spring 81 moves them forwardly of the position on which bags are being delivered onto fingers 67. This places fingers 76 forwardly of all bags then on fingers 67 and beneath the same. In response to cam 78 the fingers 76 again move quickly upwardly, remain spaced forwardly of plate 66 until the 25th bag is delivered, and then move rearwardly in response to cam 93, compressing another group of bags. The timing of these motions is such that at no time are there more than twice the number of bags required for a package on the fingers 67.

In order to assure complete separation of the bags adjacent their tops, I secure a curved arm 98 to the shaft 89, and provide on the lower end thereof a cross bar 99. This bar is timed to engage immediately in front of the 25th bag of a sub-group, and to compress the top of the stack against the plate 66. The bags forming a sub-group of the final package are now ready to be transferred from the sub-assembly mechanism to the package forming mechanism by the means now to be described.

Mounted rearwardly of the sub-package assembly mechanism previously described in suitable bearings 101 and 102 secured to the angles 26 and 27 is a driven cross shaft 103. Surrounding the cross shaft and non-rotatably secured to the framework are sleeves 104 and 106. The sleeves 104 and 106 terminate adjacent the longitudinal center of the apparatus as viewed in plan, and non-rotatably secured to each sleeve are cam mounting plates 107 and 108. Mounted on the shaft 103 between the plates 107 and 108 is a block 109. Fixedly secured in opposite ends of the block 109 are radially projecting pins 111 and 112. Surrounding the pins 111 and 112 are freely rotatable sleeves 113 and 114. The sleeves are held on the pins 111 and 112 by means of collars 116.

Referring more particularly to Figs. 12 and 13, the sleeves 113 and 114 carry identical gripping units indicated generally by the number 117 which are adapted to clamp about the sub-group of bags in the group assembly mechanism, and to transfer the same therefrom and deliver them to the package assembly mechanism. The units 117 are duplicates and the description of one will suffice for both.

Welded to the end of the sleeve 114 are a pair of plates 118 and 119 which extend outwardly to overhang the end of the sleeve 114 and its pin 112. Secured at each end in the plates 118 and 119 are pins 121 and 122. Rotatably mounted on each pin between the plates are outwardly disposed links 123 and 124. The link 123 is notched as indicated at 126, and the link 124 has a wedge shaped projection 127 extending into the notch. The links 123 and 124 are biased inwardly toward the shaft 103 by means of springs 128 and 129, anchored at one end to pins 131 and 132 secured to the sleeve 114, and at the other end to pins 133 and 134 carried respectively by the links 123 and 124. The links carry hardened pads 136 and 137 on the edges thereof as indicated and which form cam surfaces disposed to be struck by stationary cams as will later appear.

Pivotally mounted on the outer ends of each of the links 123 and 124 are outwardly extending gripper arms 138 and 139 having inturned ends 141 and 142 thereon. Welded to the end of the plates 118 and 119 are angled brackets 144 and 143 with which the ends 141 and 142 cooperate in gripping the unit 11 of bags as indicated in Fig. 13.

Secured to each of the brackets 143 and 144 are a pair of ears 146 and 147. As shown in Fig. 12, the ears 146 and 147 are spaced apart and are connected by means of a pin 148 and 149, and surrounding the pins are rollers 151 and 152. The rollers are contacted by the outer sides of the arms 138 and 139, respectively, to hold the opposite sides of the arms into engagement with the ends 153 and 154 of the brackets 143 and 144, respectively. It is to be noted, as shown in Fig. 13 that the sides of the arms 138 and 139 adjacent the ends 153 and 154 of the brackets are widened as indicated at 156 and 157. Secured to one side of one of the links (link 124), and projecting outwardly therefrom is a pin 158, the purpose of which will later be described.

From the description just given, it will be seen that when the links 123 and 124 move outwardly with respect to the sleeve 114, the widened portions 156 and 157 thereof contact the ends 153 and 154 of the brackets, thereby causing the arms 138 and 139 to spread apart. The rollers 151 and 152 serve to prevent the arms from moving apart when they are in bag gripping position, but are so disposed with respect to the moving pivotal centers of the arms and links as not to interfere with the spreading of the arms when the widened portions thereof contact the ends of the brackets. The precise functioning of this mechanism will be described in connection with the operation of the apparatus.

Referring now more particularly to Figs. 8, 9, 10 and 11, it will be seen that the plates 107 and 108 carry on their inner adjacent surfaces arcuate, complementary cams 159—161, and 162—163. The cams 159—161 are of smaller radius than the cams 162—163. Describing first the cams 162 and 163, each comprises a tapering surface 164 rising from a low point 166 and joined to a flat, non-sloping portion 167, the rise terminating at the point marked 168 in Fig. 9. The cams 159—161 each comprise a tapering portion 169 rising from a low point 171 to a point marked 172 in Fig. 9, and thence joining to a non-sloping, flat portion 173.

Mounted on the sleeve 113 are followers 174 and 176, and mounted on the sleeve 114 are followers 177 and 178. The followers on each individual sleeve are disposed at 90° to each other, and the followers 174 and 177 cooperate with the cams 162—163 while the followers 171 and 176 cooperate with cams 159—161.

With the parts in the position shown in Figs. 9, 10, and 11, and with the shaft 103, and con-

sequently the arms and gripper units 117 rotating in the direction of the arrows, Fig. 9, the follower 177 is engaged on either side between the parallel flat surfaces 167 of cams 162 and 163, preventing the sleeve 114 from rotating on its pin 112. As the follower 178 contacts the sloping surface 169 of cam 159, it causes the entire sleeve 114 to rotate 90° counterclockwise from the position shown in Figs. 9 and 11. After follower 178 passes the points 172 of cams 159—161, it holds the sleeve 114 against rotation while the group of bags is being delivered to the package assembly mechanism, as will later appear. A group of bags is then removed from the fingers 67 and rotated 90° to be laid on edge in the package assembly mechanism. Likewise, at the point in the cycle of rotation shown in Figs. 9 and 11, the follower 176 engages between the parallel surfaces 173 of cams 159 and 161 causing its sleeve 113 to be held against rotation while the group of bags in its gripper 117 are being delivered. It will be understood that the follower 176, just prior to reaching the position shown has engaged surface 169 of cam 161 rotating its sleeve and gripper 117 90°. The direction of this rotation is opposite to that imparted to sleeve 114 by its follower 178 engaging surface 169 of cam 159. After delivering its group of bags sleeve 114 is rotated reversely to starting position by the follower 177 contacting the sloping surface 164 of cam 163. Corresponding sleeve 113 is returned to starting position responsive to follower 174 engaging the sloping surface 164 of cam 162. Successively delivered groups are thus rotated oppositely whereby the thick bottom ends of adjacent groups lie at opposite ends of the assembled groups forming the package, as clearly shown in Fig. 1.

Mounted on the side of the cam mounting plates 107 and 108, and in close proximity to the group assembling mechanism previously described are a pair of cams 179 and 181. The cams are supported on bolts 182, and the bracket therefor is slotted as indicated at 183, permitting the cams 179 and 181 to be adjusted angularly with respect to the plates 107 and 108. The cams 179 and 181 are disposed to be engaged by the hardened pads 136 and 137 on the links 123 and 124, respectively, thereby to open the arms at the proper time, permitting them to engage about a sub-group of the bags resting on the fingers 67. At the proper time, the pads run off the cams 179 and 181 permitting springs 128 and 129 to cause the inturned portions 141 and 142 to clamp the sub-group 11 of the bags between these portions and the brackets 143 and 144. The bags are thus engaged automatically as the shaft 103 rotates, are raised upwardly, one group being rotated 90° in one direction, and the subsequent group being rotated 90° in the opposite direction, and are now ready to be deposited in the package forming mechanism now to be described.

Referring now particularly to Figs. 5 and 14, I mount another cross shaft 184 in suitable bearings in rearwardly disposed extensions of the side plates 21 and 22. Secured to the shaft 184 for rotation therewith are a pair of upstanding arms 186 and 187. Joining the arms at their tops is a cross member 188, and extending upwardly from the cross member are vertically spaced bars 189. Each of the bars 189 has a horizontal, rearwardly extending finger 191 on which the groups of bags are initially deposited when released from the transfer mechanism as will be described. Connected to the arm 187 is a link 192. The link extends forwardly and is slotted on its forward end as indicated at 193 to straddle the shaft 72. Adjacent the end of the link 192 is a roller 194, disposed to follow against a cam 196 secured to the shaft 72.

Mounted for oscillation on the shaft 184 is a sleeve 197. Secured to the sleeve 197 and projecting rearwardly thereof are arms 198 and 199. The arms 198 and 199 are connected by a cross rod 201 on which are mounted upstanding bars 202 and 203. The bars 202 and 203 are cross connected at their tops by a cross bar 204, and the bar 204 carries a plurality of vertically disposed fingers 206.

Intermediate its ends the sleeve 197 is provided with a crank arm 207, having its free end connected to one end of a link 208, slotted at its opposite end as at 209, likewise to straddle the shaft 72. The link 208 carries a roller 211 disposed to follow against a cam 212 also mounted fixedly on the shaft 72.

Disposed rearwardly of the mechanism carrying the fingers 206 is a vertically movable package assembling and raising mechanism to which the units or groups of bags are eventually delivered and formed into a package. This mechanism is adapted to move upwardly to place the assembled groups forming the package in a rotating mechanism later to be described. As shown particularly in Fig. 14, this mechanism comprises a cross rod 213, freely floatable, and supported on a pair of arms 214 and 216 pivotally mounted on the shaft 72. The arms 214 and 216 are cross connected as at 217 and a forwardly extending bar 218 carries on its forward end a roller 219. Mounted on the shaft 68 is a cam 221 against which the roller 219 bears to periodically raise both of the arms 214 and 216.

The cross rod 213 has rotatably mounted thereon a pair of vertically disposed arms 222 and 223, cross connected at their tops by a cross member 224. The member 224 carries vertically disposed members 226, and each of the bars has a forwardly extending, substantially horizontal, bag receiving finger 227. As shown more clearly in Fig. 5, the rear side of the vertical members 226 rests slidably against a cross member 228, thereby to hold the entire mechanism now being described to movement in a substantially vertical plane.

The several vertically disposed members and their associated actuating arms just described are biased in the directions indicated in Fig. 5 by springs 229, 231, 232, and 233. The cross member 204 on the arms 202 and 203 engages members 234 suitably secured to the framework of the apparatus and inclined at their tops toward the rear thereof. The spring 232 holds the cross member 204 in contact with the inclined members 234.

Mounted on the periphery of the cam plate 108 on the side toward the package assembly mechanism by means of a stud 236 passing through a slot 237 in a bracket is a cam 238. The cam 238 is disposed to be struck by the pin 158 depending from the link 124 as the gripping mechanisms 117 approach the package assembling mechanism just described, thereby to cause the arms 138 and 139 to move outwardly away from the package. It will be remembered that movement of link 124 also moves link 123 because of the engagement of the wedge 127 in the notch 126. This motion therefore moves the arms 138 and 139 outwardly and apart, freeing the group of bags, depositing the same on the horizontal fingers 191.

Reviewing the functioning of the mechanisms

just described, the sub-groups of bags are laid on the fingers 191 at a time when the arms 186 and 187 are in their forwardmost position, see Fig. 5. As soon as the arms 138 and 139 have released the group of bags, the link 192 moves forwardly, and simultaneously therewith the link 208 likewise moves forwardly responsive to their respective cams on the shaft 72. Thus, the fingers 206 are withdrawn, the groups of bags placed on the horizontal fingers 227 of the raising mechanism, and immediately thereafter the fingers 206 again come into raised position, immediately to the front of the last bag of the group. Upon upward movement of the arms 202 and 203, the cross member 204 thereof, being in engagement with the inclined members 234, compresses the bags against the vertical portions of the fingers 226 above the horizontal fingers 227. The fingers 206 thus serve to hold the several groups of bags on the raising mechanism until the raising mechanism is moved upwardly responsive to the action of roller 219 and its cam 221. In order to guide the package of bags in its upward movement as will later appear, I prefer to fixedly mount on the member 228 a set of vertical stationary, spaced fingers 239a, having horizontal portions 239. See Fig. 5. The vertical members 226 and their fingers 227 move upwardly between the fingers 239a and their horizontal portions 239. The package is thus assembled by the mechanism just described, and in the illustration shown in Fig. 1 four of the units 11 are used to form a single composite package. The package is now ready to be secured, and I preferably accomplish this by wrapping a length of paper tape or the like about the midportion of the package, and gluing the same in place. The mechanism for accomplishing this will now be described.

Mounted on the extreme rear end of the apparatus is a roll 241 of relatively narrow paper tape 242. The tape feeds forwardly from the roll and passes under an idler hold down roller 243 suitably journalled for rotation in brackets 244. The tape 242 next passes upwardy and forwardly in an inclined channel shaped guide 246. The inclined guide has its base slotted as at 247, the slot commencing adjacent the lower end of the guide and extending completely through the upper end thereof.

At the upper end of the guide is a cross shaft 248, suitably supported in brackets 249 and 251, and mounted on the framework of the apparatus. Surrounding the shaft 248 is a sleeve 252 carrying a roller 253 having a groove therein aligned with the slot in the guide 246. See Figs. 16 and 17. As shown in Fig. 2, the sleeve 252 carries thereon a pinion 254, meshing with a gear 256, fast on a shaft 257 mounted for rotation in suitable bearings, and having a sprocket 258 on one end. A sprocket chain 259 passes over the sprocket 258 and a sprocket 261 fast on the shaft 68.

The tape passes over the grooved roller 253, and beneath a roller 262 rotatably mounted on the end of an arm 263 pivotally mounted as at 264. The arm 263 passes over the shaft 257 which carries a cam 266 disposed to contact the arm to raise and lower the roller 262.

Mounted beneath the guide 246 is a tank 267 containing a supply of adhesive such as glue or the like. Adjacent the top of the tank is a shaft 268 carrying a sprocket 269 over which passes the sprocket chain 259. Intermediate its ends the shaft 268 carries a glue applicator 271 having a curved surface 272 disposed to extend through the slot 257 of the guide, there to contact the underside of the tape 242 and to apply thereto a line of glue. The continuously extending slot 247 prevents the glue on the underside of the tape from being smeared as the tape feeds upwardly. Likewise the groove of roller 253 serves the same purpose.

Mounted on the ends of shaft 248 are segmental gears 273 and 274. As best shown in Figs. 2 and 4, connected to the shaft 248 is a crank arm 276, having pivotally connected thereto a link 277. The link 277 extends downwardly and forwardly and has a forked end straddling the shaft 68. Adjacent its forked end the link 277 carries a roller 278 disposed to follow against a cam 279 fast on the shaft 68. The roller 278 is biased always into contact with its cam 279 by means of a relatively heavy spring 281, thus resulting in an oscillating motion in one direction being imparted to the shaft 248 and to gears 273 and 274 whenever the roller 278 runs onto the high point of the cam 279. The link 277 and consequently gears 273 and 274 are returned to start position by the spring 281 when roller 278 runs onto the low point of cam 279.

Upstanding from the angles 28 and 29 adjacent the segmental gears 273 and 274 are vertical bearing standards 282 and 283. The standards 282 and 283 carry respectively elongated, inwardly directed bearing bosses 284 and 286 in which are journalled shafts 287 and 288. The shafts 287 and 288 carry pinions 289 and 291 engaging respectively with the segmental gears 273 and 274.

Mounted on the inner ends of the shafts 287 and 288 are plates 292 and 293, respectively. Secured to the ends of the plates are the ends of pairs of inwardly projecting plates 294 and 296. Disposed at right angles to the plates 294 and 296 are a plurality of package receiving and guiding fingers 297 and 298. The plates 292—293, 294—296, and the fingers 297—298 provide a divided bag receiving compartment disposed immediately above the package raising mechanism comprising the members 226 and 227. Through the arrangement shown, it will be seen that when roller 278 is moved rearwardly and upwardly as viewed in Fig. 4, shaft 248 and gears 273 and 274 thereon are rotated, consequently rotating both halves of the package receiving mechanism in unison.

In a manner to be more definitely described later, the package has now been formed with the end of the tape 242 caught between some of the groups of the bags, preferably between the third and the last group, and has been raised upwardly into the rotating mechanism. As will presently appear, after the package is rotated and is being ejected, the tape engages a knife 299 thereby to shear and cut the tape. After receiving the package, the rotating package receiver turns one and one quarter revolutions and the ends 297a of the fingers 297 come to rest pointing rearwardly of the apparatus. This positions the package between a pair of plates 301 and 302 disposed immediately rearwardly of the rotating package receiving mechanism. It will be understood that the line of glue applied to the tape, due to the ejecting movement of the package is folded under to engage the top surface of the underlying layer of the tape and is stuck, whereby the package is now securely bound. The package ejecting mechanism will now be described.

Mounted for rotation in suitable brackets 303 is a shaft 304. The shaft 304 is driven by a sprocket 306, a sprocket chain 307, and a sprock-

et 308 mounted on the shaft 89 which as will be remembered is driven through the sprocket chain 96. As best shown in Fig. 18, the shaft 304 carries an arm 309 having pivotally mounted in its free end a bell crank 311. The arm 312 of the crank 311 is long enough to extend downwardly and engage the forward edge of the package of bags, thereby to push the same between the guide members 301 and 302 at the proper time in the cycle of operation. The bell crank 311 is held against rotation by means of a roller 313 rotatably mounted in the arm 314 of the crank and engaging a curved cam 316 suitably mounted on a depending bracket 317, formed preferably as a part of the bracket 303. The pivotal mounting of the arm 311, with the roller 313 disposed to contact the cam 316 assures that the long arm 312 moves vertically, thereby to contact the package squarely. This action is illustrated particularly in Fig. 18 wherein the mechanism is shown in dotted and full line positions.

Referring more particularly to Figs. 3, 4, and 14, adjacent the front of the apparatus and at a lower point in the framework I mount a shaft 318. The shaft 318 is driven from the shaft 32 by means of a sprocket chain 319. Mounted on the end of the shaft 318 adjacent the side plate 22 is a pinion 321. The pinion 321 meshes with a gear 322 fast on the shaft 72. The shaft 72 carries a smaller gear 323, in turn meshing with a gear 324 fast on the shaft 68. Shaft 68 carries a sprocket 326, over which passes a sprocket chain 327, in turn passing over a sprocket 328 fast on the shaft 103.

The ratios of the various sprockets and gears are such that all of the motions operate in timed relation with respect to the delivery of bags from the vane wheel. For the purpose of describing the functioning of the apparatus, it will be assumed that the vane wheel delivers five bags per each revolution. At that rate, shaft 68 makes one revolution per hundred bags; shaft 72 makes one revolution for each fifty bags; shaft 318 turns one half the speed of the vane wheel, or in other words, makes one revolution for each ten bags; shaft 89 rotates one revolution per twenty five bags; shaft 304 one revolution per one hundred bags; shaft 103 one revolution for each fifty bags; and shafts 257 and 268 one revolution for each one hundred bags. The sleeve 252 is driven at such speed that during the time the roller 262 engages the tape, a sufficient length of the tape is fed outwardly to provide an adequate length thereof for engaging between the units, and to provide a length thereof to accommodate raising the package without pulling loose the frictionally engaged end.

From the foregoing, the operation of my improved mechanism so far described may now be explained and understood. Referring particularly to Figs. 20 to 25 inclusive, the bags are delivered between the belts 14 and 16 into the fingers 42 of the vane wheel mechanism 37. The bags are then deposited onto the fingers 67 of the group collecting and assembling mechanism, it being understood that the separator fingers 76 and 77 are normally in raised position, and that the bags assemble on the rearward sides of the fingers. As soon as twenty five bags are delivered onto the fingers 67, the fingers 76 and 77 move rearwardly responsive to cam 93 separating the group of twenty five bags from those being delivered forwardly thereof. Simultaneously, the overhead separator comprising the arm 98 and cross bar 99 engages the tops of the bags further compressing and separating the same. Substantially simultaneously with these motions a gripper unit 117 moves into position, its jaws are opened by the hardened pads 136 and 137 engaging the curved cams 179 and 181, engages the sides of the upright group 11 of bags. As soon as the pads run off the upper ends of the cam members, the jaws snap shut responsive to the action of springs 128 and 129, gripping the group of bags. On their upward and circular movement, the bags are rotated 90° through the medium of the cams 159 or 161, whereby the particular group of bags is laid on edge on the horizonal fingers 191 with the bottoms thereof at one end of the package to be formed. As soon as the group 11 of bags is laid on the fingers 191, the cam 196 rocks the entire group receiving mechanism toward the rear, and simultaneously cam 212 causes the separating and compressing fingers 206 to be withdrawn. The fingers 206, upon moving downwardly also move slightly forwardly responsive to action of spring 232 and the inclined members 234. As soon as the bags have moved rearwardly onto the fingers 227 of the package lifting mechanism, the fingers 206 rise again forwardly of the package and move rearwardly to compress the same against the upper ends of members 226. After three of the sub-units 11 have been deposited in the package assembling mechanism, cam 266 permits lever 263 to lower, thereby causing roller 262 to engage the top of the tape and press it against driven roller 252, feeding the tape outwardly over the upper edges of the bags in the assembly mechanism. When the fourth and final sub-package is delivered, its downward movement onto the fingers 191 and its subsequent rearward motion serves to enagage the free end of the tape between the third and fourth packages as clearly shown in Figs. 21 and 22. The fingers 189 now move rearwardly the last time to hold the groups compressed, fingers 206 at this time being lowered. Cam 221 now causes the fingers 227 to move upwardly, pushing the entire package of four groups of bags upwardly into the rotating package mechanism, and with the tape 242 still caught therebetween. As soon as the bags are in the rotating mechanism, cam 79 moves link 277 rearwardly, that is to the left as viewed in Fig. 4, rotating the segmental gears 273 and 274 counterclockwise as viewed in Fig. 4, thereby rotating both halves of the package rotating mechanism clockwise and in unison as viewed in Fig. 4. As the package is being rotated, the applicator applies the line of glue on the tape at a point just ahead of the point where it will be severed. The package has now assumed the position shown in Fig. 25, whereupon the ejecting mechanism moves rearwardly, the long arm 312 engaging the forward side of the package, commencing to push the same rearwardly between the discharge guide members 301 and 302. Rearward movement of the package brings the line of glue on tape into contact and the subjacent layer of the tape on the then bottom of the package gluing the same, and forcing the tape into contact with the knife 299, shearing the tape. The loose end of the tape leading from the roll is now ready to be fed further outwardly over subsequent packages to be formed, thus providing the necessary loose end to be caught between groups. It will be seen that the package rotates one and one quarter revolutions and the depending end of the tape carrying the line of glue is forced into con-

tact with the subjacent layer upon movement of the package between members 301 and 302.

In order to cushion the package while it is being made up, I may provide a U-shaped flat spring 329 secured to the member 228 against which the groups of bags and the final package are pressed by the fingers 189 and 206.

It is to be especially noted that fingers 206 not only serve to hold the previously deposited groups of bags on the fingers 227, but that they also serve to support a group of bags deposited on the fingers 191, preventing them from falling rearwardly until the pivotally mounted receiver comprising the fingers 189 and 191 moves forwardly. Likewise, the cam 238 as well as the cams 179 and 181 may be adjusted by means of the securing studs and slots, thus to time the pickup and release of the groups of bags. Also, the plates 107 and 108 may be rotatably adjusted on the supporting sleeves 104 and 106, thereby to vary the timing of the twisting motion imparted to the pickup mechanisms 117.

In Figs. 26 to 33 inclusive I show a somewhat modified form of sub-group assembling mechanism, having, among others, the advantage of simplicity over the one already described. In these figures I also disclose a modified form of rotating package receiver which has the advantage of resiliently gripping the package as it is moved upwardly into the receiver, and which further embodies a continuously rotated element together with a clutch for periodically engaging the package receiver thereby to rotate the same at the proper time in the cycle of operation.

Referring now particularly to Figs. 26 and 27, it will be seen that I have eliminated the lower separator in its entirety, thus eliminating many of the cams and levers necessarily employed therewith. In place of the lower separator, I mount on the angles 26 and 27 L-shaped brackets 331 and 332, having horizontally inturned portions 333 and 334. The inturned portions stop short of each other as shown particularly in Fig. 27, and adjacent their ends I provide depending brackets 336 and 337. On the adjacent faces of these brackets I provide longitudinally disposed spring fingers 338 and 339.

Adjacent the ends of the horizontal portions 333 and 334 are U-shaped springs 341 and 342, each secured to the inturned portions 333 and 334 as at 343 and 344. The rear ends of the springs are downturned as indicated at 346 and 347.

The separator arm 98 and its cross bar 99, together with the remainder of the mechanism previously described are employed with the brackets and spring fingers. In operation, the bags come off the vane wheel mechanism 37 in the manner already explained, and after every twenty fifth bag the arm 98 enters in front thereof, thereby forcing the bags rearwardly against the plate 66, and with the bottoms of the bags resting on the fingers 67. The springs 338—339 and 341—342 are so adjusted as to engage respectively the sides and tops of the bags with sufficient friction to prevent them from moving rearwardly past the downturned ends 346 and 347 once the arm 98 and bar 99 move them thereagainst. In addition to aiding in the separation of the bags into groups of twenty-five, I have found that the spring fingers 341 and 342, as well as the ones at the sides serve to align the bags, causing them to come out in a very neat group. Due to the speed at which the bags are striking the fingers 67, they have a tendency to bounce and this of itself provides some vibration for the fingers 341 and 342 which tends to joggle the bags in the mechanism, thereby straightening and aligning the same.

Referring now to Figs. 28 to 33, inclusive, I show a modified form of rotating package receiving mechanism embodying bearing brackets 348 and 349 mounted on the angles 28 and 29 of the mechanism adjacent the rear end thereof. Except as will be explained both halves of the mechanism are identical and a description of one will suffice for both. Rotatably mounted in the brackets are shafts 351 and 352 in the form of a sleeve. Mounted on the inner adjacent ends of the sleeve shafts is a U-shaped bracket 353. The legs of the U-shaped brackets extend outwardly to lie alongside the inwardly projecting bearing brackets 348 and 349 and are provided with openings 354 each receiving a pin 356. Pivotally mounted on the ends of the pins 356 are inwardly extending arms 357, secured to the pins 356 by means of lock pins 358. The arms 357 extend inwardly, and carry on their inner free ends a pair of gripping units 359 in the form of plates, the innermost ends and bottom edges of which are turned outwardly slightly as indicated at 361.

The arms 357 are spring biased toward each other by means of springs 362. Mounted fixedly on the sleeve shaft 351 is an actuating dog 363 having its ends 364 and 366 disposed in alignment with the arms 357 inwardly of their pivots on the pins 356.

Interposed between the ends of the dog and each of the arms 357 on opposite sides of the dog are actuating pins 367 and 368. The pins fit at either end in sockets 369 and 371 provided in the dog and arms, respectively. A small spring 372 anchored at its ends to the dog 363 and to the bracket 353 serves to prevent the pins 367 and 368 from falling out of the sockets. From the mechanism just described, it will be apparent that when the dog 363 is rotated counterclockwise as viewed in Fig. 33, the arms 357 and consequently the plates 359 are spread apart against the force of the springs 362. This motion is accomplished at the proper time by mechanism which will later be described.

Passing through the sleeve 351 is a rod 373. On the inner end of the rod 373 I mount a plate 374 having ears 376 disposed to project outwardly through the plate 359 through slots 377 therein. These plates form guides for the ends of the group of bags as they are pushed upwardly into the rotating receiving mechanism. The rod 373 may be held against inward movement by means of a collar 378. The ears 376 and slots 377 serve to hold the plate 374 in place, and at the same time permit the plates 359 to move inwardly and outwardly with respect thereto.

Referring particularly to Figs. 26, 29, 30 and 31, and 34 to 39 inclusive, I will now describe the modified drive arrangement for intermittently rotating the package receiving mechanism just described. Extending rearwardly from each of the brackets 348 and 349 are bearing supports 379 and 381. Mounted for rotation in the bearing supports 379 and 381 is a cross shaft 382. On the extreme end of the shaft 382 adjacent the bracket 381 is a sprocket 383. On the opposite end of the shaft 382 is a similar sprocket 384. Secured to the sleeve shafts 351 and 352 are sprockets 386 and 387 over which pass sprocket chains 388 and 389, whereby the two halves of the rotating package receiver rotate in unison upon rotation of shaft 382.

Mounted for rotation on the shaft 382 is a

pinion 391. Meshing with the pinion 391 is a gear 392, secured to another cross shaft 393, supported for rotation in bearings carried by upstanding supports 394 and 396. The cross shaft is continuously driven from shaft 68 through chain 259 in the manner already explained with respect to the driving of shaft 257. As best shown in Fig. 31, the pinion 391 has secured to the outer face thereof a disc 397 having a groove 398 in one face thereof. Secured in the groove 398 is an annulus 399 of friction material.

Outwardly of the pinion and plate 397 I secure about the shaft 382 a ferrule 401, exteriorly threaded as indicated at 402. Between the ferrule and the plate 397 I secure another disc 403, and outwardly of the disc 403 I mount yet another disc 404. The disc 404 is provided with a centrally disposed opening 406 adapted to fit against the spherical seat 407 of a nut 408 threaded on the ferrule 401. Secured in the plate 403 and projecting outwardly therefrom through openings 409 in the plate 404, are a plurality of pins 411. Surrounding each pin and interposed between the discs 403 and 404 are compression springs 412. It will be apparent from the mechanism just described that rotation of gear 392 rotates pinion 391, and consequently the disc 397 carried thereby, and that the shaft 382 will be rotated through the friction material 399 and plate 403, provided the springs 412 are adjusted to press the plate 403 into engagement with the friction material. The springs 412 continuously push the disc 403 into engagement with the friction material with a pressure determined by the adjustment of nut 408, the assembly thus forming a slip type clutch.

The disc 403 is provided with a pair of peripherally disposed notches 413 and 414 displaced 90° apart. Mounted on a lug carried by the bracket 394 is a dog arm 416 having a foot portion 417 disposed to engage selectively in the notches 413 and 414. The dog arm 416 is pivoted to the bracket 394 as at 418, and at its opposite end carries a roller 419. The roller 419 bears against a cam 421, fast on the shaft 393. A small spring 422 fastened to the arm 416 serves to bias the foot 417 normally against the disc 403.

Referring particularly to Figs. 29 and 30, nonrotatably secured to the sleeve shaft 352 is a disc 424. The disc has inclined notches 426 and 427 in its periphery. Disposed to engage selectively in the notches 426 and 427 is the rounded end 428 of a pusher member 429. The member 429 is slotted at its oposite end as indicated at 431, to slidably straddle the shaft 393. Adjacent the slotted end the member 429 carries a roller 432 disposed to contact a cam 433 fixedly mounted on the shaft 393. The slotted end of the arm is held against axial movement on the shaft by means of a collar 434. The end 428 of the arm is held against lateral shifting with respect to the disc 424 by means of a yoke 436 disposed to fit about the sides of the disc 424. A spring 438 serves to bias the end 428 of the pusher into contact with the periphery of the disc 424.

From the mechanism just described it will be seen that when the pusher member 429 moves upwardly and to the right as viewed in Fig. 29, the plates 359 of each half of the rotating package receiving mechanism are spread apart due to the rotational movement of the dog arms 363. Both sets of the plates 359 are actuated simultaneously through the cross shaft 393, it being understood that each of the sleeve shafts 351 and 352 are provided with the discs 424, and that there are two of cams 433 and pusher members 429.

From the foregoing the operation of the mechanism described above may now be explained, particular reference being had to Figs. 34 to 39, inclusive. As before stated in connection with the first described modification, the units or groups of bags 11 are delivered to the package assembling mechanism and by that mechanism are pushed upwardly into the rotatable receiver. During the time when the bags are being pushed upwardly, plates 359 are held open by reason of the fact that the cams 433 are engaging the rollers 432, thereby to move the pusher members upwardly, rotating the sleeve shafts 351 and 352, consequently the dogs 363, and moving the pins 367 and 368 outwardly. The parts in this position are indicated in Fig. 34. As soon as the complete package of bags is positioned between the plates 359 of both halves of the rotating mechanism, roller 432 runs off the high point 433*a* of cam 433, permitting the plates 359 to move toward each other responsive to springs 362. This position of the parts is shown in Fig. 35. By this time the point marked P on cam 433 will have moved approximately 41° from the start position indicated in Fig. 34. As shown in Fig. 36, a high point 421*a* on cam 421 next strikes roller 419, moving the end 417 of the dog 416 out of notch 414. This occurs when point P has rotated approximately 94° from start position. The high point 421*a* of cam 421 first to engage roller 419 is arcuately long enough to hold the dog arm out of contact with disc 403 until shafts 382 and 352 make slightly more than one revolution. The point 421*a* of cam 421 then runs out, and roller 419 lets the dog arm engage the periphery of disc 403, whereupon end 417 thereof engages in notch 413. The package receiver has thus been rotated one and one-quarter revolutions, and point P has by this time moved approximately 173° as shown in Fig. 38. Immediately after the end 417 falls in notch 413, a portion 433*b* of cam 433, of slightly less radius than the portion 433*a*, engages roller 432, moving the pushers 429 upwardly, rotating discs 424, and spreading plates 359 of each half of the rotating mechanism, freeing the package for ejection. See Fig. 39. By this time the ejector arm 312 will have moved around into position to engage the forward side of the package, and push the same outwardly between the members 301 and 302. After the package is ejected, small protuberance 421*b* on cam 421 contacts roller 419, removing the dog end from notch 413 and immediately releases the same for engagement against the side of disc 403, responsive to spring 422. When shaft 382 has rotated three-fourths of a revolution, the dog again engages in notch 414. Continued rotation of shaft 393, carrying the cams 433 and 421 causes the portion 433*a* to again ride under the roller 432, moving the pusher 429 upwardly, and again opening the plates, thus completing a cycle of operation. It will be understood that the tape feeding mechanism previously described is employed with the mechanism just mentioned, with the result that the tape is wrapped around the package, and glued in place during ejection. I have found that the slip clutch is entirely effective in driving the rotatable mechanism, and that any slippage therein is compensated for due to the dog reentering the notches 414 and 413, thus in effect retiming the shafts 393 and 382 with respect to each other each time the dog enters a notch. Therefore, during the time in

the cycle when the receiver is to receive a package the plates thereof are spread apart, and the rounded lower edges **361** thereof are down, to serve as guides for the assembled groups of bags being pushed upwardly thereinto.

I have found that the last described modification of my invention is especially adapted for use in packaging the smaller sizes of bags. The spring fingers **341** and **342**, and the spring guides **339** and **338**, in combination with the overhead separator **98** are entirely effective in separating the bags into groups as they are delivered onto the fingers **67**. I have thus been able to eliminate much of the mechanism adjacent the forward end of the machine, thereby simplifying and reducing the cost of the same. The particular advantage in the modified form of package receiver is that the free ends of the pairs of plates **359**, when disposed and constructed as shown are free to contact each other when the pushers are disengaged from disc **424**, thus to make the apparatus self-clearing in the event fewer than a full package of bags is delivered. In other words, the plates **359** will engage and hold anywhere from one to one hundred bags, permitting the tape to be wrapped thereabout, and present the package thus formed for ejection. My improved apparatus thus constructed eliminates the necessity of having to remove by hand some of the bags delivered from the bag making machine, to bring the two in timed operating relation, if the same commence operation out of time with respect to each other.

The advantage in the clutch mechanism for rotating the wrapping mechanism will be readily appreciated, since it eliminates the reciprocating motion of the segmental gears described in connection with the first modification.

From the foregoing, it will be apparent that I have devised an improved method and apparatus for forming individual paper bags into packages. A machine embodying the principles of my invention, and on which my improved method may be carried out, has been built and operates satisfactorily in every manner. It is to be especially noted that while the device handles a large number of bags, the moving parts as a whole travel slowly. For instance, with the vane wheel mechanism delivering 1500 bags per minute, it rotates 300 R. P. M., shaft **103** rotates 30 R. P. M., shaft **304** rotates 15 R. P. M., shaft **89**, 60 R. P. M., etc., the speeds of all of which may be easily calculated from the information given heretofore. This has the effect of reducing considerably the wear of the parts, and enables the bags to be accurately positioned and assembled for wrapping without requiring moving parts which operate at excessive speed. It will likewise be apparent to those skilled in the art that my improved method may be carried out on various forms of apparatus, and that inherently in apparatus of this kind many of the details thereof may be varied without departing from the spirit of the invention. While I have disclosed and described a machine which is purely mechanical in nature, it is quite possible as will be apparent to those skilled in the art to actuate certain parts thereof by other means, such as solenoids, air or hydraulic cylinders, air and electric motors and other forms of mechanism. Therefore, while I have shown my invention in but two forms, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire therefore that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. The method of assembling individual paper bags and the like into a package which comprises the steps of assembling the bags into groups at a common assembly station each containing an equal and predetermined number of bags, transferring the groups of bags one at a time to a common package assembly station and while in transit between said stations continuously rotating successively delivered groups in opposite directions whereby adjacent groups of bags are deposited on the assembly station with the bottoms of the bags thereof disposed at opposite ends of the package, feeding a length of a securing member over some of the groups of bags while on the assembly station prior to arrival of at least one other group at said assembly station, frictionally engaging the free end of said member between a pair of adjacent groups of bags, and winding the securing member about all the groups to secure the package.

2. The method as defined in claim 1 in which the securing member is wound around the groups by rotating all the groups while in package forming relation and while said end is engaged between groups.

3. The method of assembling paper bags and the like into a package which comprises assembling the bags in upright position into groups each containing an equal and predetermined number of individual bags, transferring the bags to a package assembly station, rotating the successive groups 90° in opposite directions while moving between said stations, laying said groups in side by side relation and with the bottoms of the bags of adjacent groups at opposite ends of the package, feeding the end of a continuous strip of tape over at least one of the groups occupying the package assembly station and prior to the arrival thereat of the next adjacent one of said groups forming the package, whereby upon arrival of a group subsequent to the first group the end of said tape is caught between a pair of groups, raising the package vertically off the package assembly station, and rotating the entire package about its longitudinal axis to wind the tape thereabout.

4. In apparatus for forming paper bags and the like into packages, mechanism for assembling the individual bags into groups, a package assembly mechanism, mechanism operable to lift said groups bodily from the group assembly mechanism and deliver them onto the package assembly mechanism, the last named mechanism embodying means for rotating successively delivered groups in opposite directions while in transit whereby the bottoms of the bags of adjacent ones of said groups lie at opposite ends of the package, means for engaging one end of a securing member between some of said groups while on the assembly station, mechanism for raising the assembled groups upwardly with the end of said member therebetween, and other mechanism for receiving and rotating the assembled groups to wind the securing member thereabout.

5. In apparatus for forming paper bags and the like into a package, mechanism for receiving, aligning, and dividing the bags into groups of like number as they are delivered thereto, package assembly mechanism, mechanism for trans-

ferring the groups one at a time from the receiving mechanism to the packaging mechanism, said transfer mechanism embodying means for rotating successively delivered groups in opposite directions while in transit between the group and package assembly mechanisms whereby when placed on the package assembly mechanism the bottoms of the bags of adjacent groups lie at opposite ends of the package, a rotatable package receiver disposed to receive the package from the assembly mechanism, means to secure one end of a length of tape or the like between adjacent groups of bags, means to move the assembled package into the rotatable receiver with the end of the tape secured therebetween, and means operable after the package is moved thereinto for rotating said receiver to wind the tape about the package.

6. Apparatus as defined in claim 4 in which that part of the package assembly mechanism on which the groups are assembled is reciprocable into package transfer relation with respect to the rotatable package receiving mechanism, and in which the means to move the package into the rotatable receiver embodies mechanism for reciprocating said part of the package assembly mechanism.

7. In apparatus for forming paper bags and the like into packages, mechanism for receiving, aligning, and dividing the bags into groups of like number as they are delivered thereto, package assembly mechanism embodying a reciprocable group receiving and supporting portion on which the groups are assembled in package forming relation, a rotatable group transfer mechanism disposed in group pickup relation with the bag receiving mechanism and in group delivery relation with the package assembly mechanism, other mechanism associated with the transfer mechanism operable to rotate successively delivered groups in opposite directions whereby the bottoms of the bags of adjacent groups lie at opposite ends of the package, means for rotating the transfer mechanism in timed relation with the formation of the bags into groups, a rotatable package receiver disposed to receive the package from the package assembly mechanism upon reciprocation of the latter, means operable to reciprocate the package assembly mechanism in timed relation with respect to delivery thereto of a predetermined number of said groups, means to place a length of binding material in contact with the assembled groups, and means operable after the transfer of the assembled groups to rotate the package receiver thereby to wind the binding material about the assembled groups.

8. In apparatus of the character designated, a bag receiver onto which individual bags are delivered, counting and separating mechanism associated with the bag receiver and operable to divide the bags into groups of given number while the same are being continuously delivered to the receiver, a rotatable shaft adjacent the bag receiver, a group transfer mechanism rotatable with said shaft having means for engaging and removing the groups from the bag receiver, a package assembly station embodying vertically and horizontally reciprocable mechanisms, said horizontally reciprocable mechanism being disposed in the path of the groups of bags removed by said transfer mechanism, mechanism for releasing the group engaging means of the transfer mechanism substantially upon deposition of the group of bags on said horizontally reciprocable mechanism, means operable after receipt of a group of bags to move the horizontally reciprocable mechanism over the vertically reciprocable mechanism thereby to deposit the group of bags onto the latter, mechanism for feeding a length of paper tape outwardly over at least one of the groups of bags after it is on the vertically reciprocable mechanism whereby upon delivery of a subsequent group the end of said tape is caught between groups, a rotatable package receiver disposed to receive the groups from the vertically reciprocable mechanism, means operable after delivery of a predetermined number of groups for moving the vertically reciprocable mechanism thereby to transfer the package to the rotatable receiver, and means operable after the transfer of said predetermined number of groups for rotating the rotatable receiver to wind the tape about the groups.

9. Apparatus as defined in claim 8 in which the group transfer mechanism also includes mechanism for rotating successively transferred groups of bags in opposite directions whereby adjacent groups are assembled in the package with the bottoms of the bags thereof disposed at opposite ends of the package.

10. The combination with a bag making apparatus embodying means for discharging the bags continuously as they are made, of bag receiving mechanism disposed to receive bags discharged from the bag machine, means associated with the bag receiving mechanism for forming the bags successively into groups of like number as they are delivered to the bag receiving mechanism, transfer mechanism operable upon formation of each group of bags to lift it bodily from the bag receiving mechanism, a package assembly mechanism embodying a portion onto which said groups are delivered by the transfer mechanism and another portion on which the groups are assembled in package forming relation, means for transferring the groups one by one from the portion of the package assembly mechanism to which the transfer mechanism delivers the groups to that portion thereof on which the groups are assembled in package forming relation, means mounting the package assembly portion of said mechanism for vertical movement, and means operable after the delivery of a predetermined number of groups to the package assembly mechanism to move the vertically movable portion of the package assembly mechanism upwardly to remove the assembled groups therefrom as a unit.

11. In apparatus for packaging paper bags and the like as they are delivered from a bag making machine, mechanism embodying a rotatable wheel, individual compartments on the periphery of said wheel into which the bags are delivered by the bag making machine, mechanism for removing the bags from the compartments embodying substantially horizontal fingers disposed in close proximity to the rotatable wheel and on which the bags are deposited in a vertical position responsive to rotation of said wheel, means to assemble the bags into groups of predetermined number after they are delivered onto the fingers comprising a substantially vertically moveable separator, means associated with the separator to position it between the last bag of said predetermined number and subsequently delivered bags, and mechanism for removing the assembled groups and assembling a predetermined number thereof into a package.

12. Apparatus as defined in claim 11 in which the fingers are reciprocally mounted for move-

ment toward and away from the rotatable wheel and in which a spring biases the fingers toward said wheel.

13. Apparatus as defined in claim 11 in which the wheel is provided with discs at either side and rotatable therewith and disposed to frictionally engage the edges of the bags as they are removed from the wheel by said fingers.

14. Apparatus as defined in claim 11 in which the fingers for removing the bags are mounted on the upper end of a vertically disposed arm pivotally mounted at a point beneath the axis of rotation of the wheel for movement toward and from the wheel, and means to adjustably secure the fingers in selected vertical position on said arm, thereby to vary the point at which the bags are removed from the wheel.

15. Apparatus as defined in claim 11 in which the separator is shiftable downwardly from a position in contact with the last bag of said group to a position beneath the fingers, and then upwardly again prior to the placement of said fingers of the last bag of a subsequently formed group.

16. Apparatus as defined in claim 11 in which said separator is disposed to contact the said last bag adjacent the bottom thereof, another separator disposed to contact the said last bag adjacent the top thereof, means to operate said separators in timed relation with respect to each other and in timed relation with respect to the delivery of bags to said wheel, whereby each time the last of said predetermined number of bags of a group is delivered onto the fingers said separators move substantially simultaneously into contact therewith.

17. Apparatus as defined in claim 11 in which the mechanism for removing a given group commences to remove the same while the separator is engaged with the last bag of said group.

18. In apparatus for packaging paper bags and the like, mechanism for forming the bags into groups of predetermined and equal number as the bags are delivered thereto, mechanism operable to receive a predetermined number of groups and secure them together to form the package, group transfer mechanism operatively disposed in group pickup relation with respect to the group forming mechanism and in group discharge relation with respect to the group receiving mechanism comprising a rotatable arm, a releasable group pickup mechanism on each end of the arm, means operable upon arrival of said pickup mechanism at a group of bags in said group forming mechanism to engage the group, and means operable upon arrival of said pickup mechanism in discharge relation to the group receiving mechanism to release said group.

19. In apparatus for packing paper bags and the like, mechanism for forming the bags into groups of predetermined number with the bags in upright position, mechanism operable to rereceive a predetermined number of groups in assembled relation and secure them together to form the package, mechanism for transferring the groups from the group forming mechanism to the package forming mechanism comprising an arm mounted adjacent its center for rotation in a vertical plane, means rotating the arm in timed relation to the formation of the groups, a releasable group pickup mechanism mounted for rotation on the outer ends of said arm each disposed to releasably engage and lift from the group forming mechanism a group of said bags, cams associated with the pickup mechanisms and operable to effect rotation of each of the same 90° in opposite directions on its associated arm after the groups are lifted and while engaged thereby, and means coacting with the pickup mechanisms to release the bags therefrom upon arrival of each group at the assembly mechanism.

20. Apparatus as defined in claim 19 in which the rotatable arm is rotated in timed relation with respect to the formation of the bags into groups whereby at no time are there more than twice the said predetermined number of bags required for a group in said group forming mechanism.

21. Apparatus as defined in claim 19 in which the pickup mechanisms each embody a movable jaw between which the groups are engaged, springs biasing the jaws toward closed position, and stationary cams disposed to be operatively engaged by said jaws to open the same when they are in group pickup and delivery position.

22. Apparatus as defined in claim 19 in which the pickup mechanisms each embody a pair of jaws spring biased toward closed position and disposed to simultaneously engage the edges of a group of bags, stationary cams for opening the jaws as the pickup mechanisms approach the group forming and group assembling mechanisms, and means adjustably supporting said cams whereby the points of pickup and release of the groups may be varied.

23. In apparatus for packaging paper bags and the like, means operable to assemble the bags into groups, means displaced from said bag assembling means and disposed to receive a plurality of said groups in package forming relation, means operable to transfer said groups from the bag assembly mechanism to the group receiving mechanism comprising a shaft disposed between the bag assembly and group receiving means, means to rotate said shaft in regular timed relation with the assembly of the bags into groups, a pair of opposed pins secured to the shaft extending radially therefrom and disposed to rotate in a vertical plane with the longitudinal axis of said shaft as a center, a sleeve rotatably mounted on each pin, stationary cams disposed at each side of said sleeves, followers on the sleeves coacting with said cams to rotate the sleeves, said cams and followers being constructed and arranged to impart a ninety degree rotation to each of said sleeves about its pin as each sleeve passes a given point responsive to rotation of said shaft, and being further constructed and arranged to rotate each of said sleeves reversely ninety degrees to start position as each sleeve passes a second given point and responsive to continued rotation of said shaft, and a group pickup transfer and delivery mechanism nonrotatably mounted on the outer end of each sleeve and disposed as said sleeve rotates in said vertical plane to successively engage groups of bags in the bag assembly means and deliver them to the group receiving means.

24. Apparatus as defined in claim 23 in which the cams and followers are constructed and arranged to effect the first ninety degree rotation of the sleeves on their pins after the pickup mechanism has removed a group of bags from the bag assembly means, and to effect the second degree rotation of said sleeves on their pins after the groups are deposited in the group receiving means.

25. Apparatus as defined in claim 23 in which the pickup mechanisms engage a group of bags

in the bag assembly means while moving upwardly and deliver the same to the group receiving means while moving downwardly.

26. Apparatus as defined in claim 23 in which each of said pickup mechanisms on the end of said sleeves comprises a pair of pivoted links projecting outwardly of the sleeve in a direction generally normal to the longitudinal axis thereof, an arm pivoted in the outer end of each link and extending outwardly of the sleeves generally parallel to the longitudinal axis thereof, an inturned lug on the outer ends of said arm, a member on the end of the sleeves with which the lugs cooperate to grip a group of bags at each side, and springs biasing the lugs toward said member.

27. Apparatus as defined in claim 26 in which the inner pivoted end of said links carry coacting elements effective to rotationally lock the links together whereby upon pivotal movement of one of said links the other rotates.

28. Apparatus as defined in claim 23 in which the arms and member on the end of said sleeves are provided with coacting elements effective upon pivotal movement of the links in a direction towards said member to spread apart the arms thereof, and in which the arms have associated therewith means restraining them against spreading apart except in response to said pivotal movement of the links.

29. In apparatus for transferring groups of paper bags and the like from a bag assembly mechanism to a group receiving mechanism, there by other mechanisms to be formed into a package containing a plurality of said groups comprising a shaft disposed between the bag assembly and group receiving mechanisms, means to rotate the shaft in timed relation with respect to the formation of the groups, at least one pair of diametrically opposed pins rotatable with said shaft and disposed at right angles to the longitudinal axis thereof, a group pickup mechanism carried by each of said pins and movable from group pickup to group delivery position with the bag assembly and group receiving mechanisms respectively, means operable to releasably engage the pickup mechanism about a group of bags in the bag assembly mechanism, means to release the groups from said pickup mechanisms as they reach the group receiving mechanism, cams operatively associated with the pickup mechanisms for rotating them equally but oppositely about their pins after each has engaged a group of bags and before arrival of the groups at the group receiving mechanism, said cams being further disposed to rotate each pickup mechanism to start position after the groups of bags are delivered to the group receiving mechanism, and means to hold said pickup mechanisms against rotation while picking up and discharging groups.

30. Apparatus as defined in claim 29 in which the means to releasably engage the pickup mechanism about groups of bags and to release the groups from said pickup mechanisms comprises stationary cams, and movable portions on said pickup mechanisms disposed to engage said cams as they approach the group assembly and receiving mechanisms.

31. In apparatus for packaging paper bags and the like, means to form the bags into groups of predetermined number, a group assembly means operable to receive a plurality of said groups in packaging forming relation, a receiver for the assembled groups comprising a pair of spaced axially aligned shafts mounted for rotation, releasable group gripping units on adjacent ends of said shaft, springs biasing said gripping units toward group gripping position, means for spreading said gripping units apart, mechanism for placing the assembled groups in said units, means to place a length of binding material in contact with the groups of bags, and means to rotate said units in unison thereby to wind the binding material about the groups.

32. Apparatus as defined in claim 31 in which the means to rotate the gripping units comprises a clutch embodying a rotary driving element, a rotary driven element operatively connected to said gripping units and frictionally connected to the driving element, and means to selectively hold and release said driven units.

33. Apparatus as defined in claim 31 in which there is operatively associated with said gripping units mechanism to rotate the same a predetermined number of degrees after receiving the groups of bags, and thence operable to return the gripping units to start position.

34. In apparatus for rotating assembled groups of paper bags and the like to wind thereabout a securing member, a receiver for the groups mounted for rotation, a friction clutch embodying rotary driving and driven elements, means operatively connecting the driven element to said receiver, a member releasably engaging the driven member, and mechanism operable to release the member from said driven element thereby to effect rotation of the receiver, said mechanism also being operable to engage said member with the driven element after a predetermined amount of rotation of the receiver, thereby to hold the same against further rotation.

35. In apparatus for receiving and rotating groups of paper bags and the like disposed in package forming relation to wind thereabout a securing member, a receiver for the groups comprising two portions mounted for rotation in unison, a friction clutch embodying rotary driving and driven elements, means operatively connecting the driven element to both halves of the receiver, a continuously rotating shaft, a cam fast on said shaft, a member spring biased into contact with said driven element and disposed to hold the same against rotation with the receiver in position to receive an assembled group of bags, means operable upon rotation of said cam to disengage the member from said driven element after the groups are in said receiver, means to engage the member with the driven element after the receiver has rotated to group discharge position, and means on said cam for releasing the member a second time whereby it is operative to engage the driven member after the receiver returns to group receiving position.

36. Apparatus as defined in claim 49 in which the driven element is a disc and is provided with a pair of notches on its periphery displaced ninety degrees apart, and in which said member is a dog disposed to engage in said notches to hold the receiver against rotation.

37. Apparatus as defined in claim 35 in which each portion of the receiver comprises a pair of members between which the opposite ends of the assembled groups are placed, springs biasing said members together, and means to open said members against the force of said springs while the receiver is in package receiving and discharge position.

38. Apparatus as defined in claim 35 in which each portion of said receiver comprises a pair of plates between which the opposite ends of the assembled groups are placed, means biasing said plates toward the groups, a pair of other cams fast on said continuously rotating shaft, and means operatively connecting said other cams to each of said pair of plates whereby the plates are spread apart while the receiver is in group receiving and discharge position.

39. In apparatus for receiving and rotating groups of paper bags and the like disposed in package forming relation to wind thereabout a securing member, a receiver for said package comprising two package gripping portions mounted for rotation in unison and with each portion disposed to receive an end of said package, a friction type slip clutch embodying driving and driven members, a continuously rotating shaft, means to drive the driving member of said clutch from said shaft, a second shaft on which the driven member is fixedly mounted, a driving connection between the second shaft and each portion of the receiver, a cam on the continuously driven shaft, a dog associated with said cam and operable to releasably engage and hold said driven member and second shaft against rotation with said receiver selectively in package receiving and discharge positions, a pair of other cams on said continuously rotating shaft, and means operatively connecting said other cams to the receiver for simultaneously opening the same to receive and release the package when the receiver is in package receiving and discharging positions.

40. Apparatus as defined in claim 39 in which each portion of the receiver comprises a pair of plates spring biased toward each other, a hollow shaft on which the plates are fixedly mounted for rotation, an internal shaft in each hollow shaft, an arm on the end of said internal shaft between said plates, pins operatively interposed between opposite ends of the arm and the plates, and a member on the opposite end of said internal shaft disposed for rotation by one of said other cams thereby to spread apart the plates.

41. Apparatus as defined in claim 39 in which each portion of the receiver comprises a hollow horizontally disposed rotatable shaft axially aligned with respect to the shaft of the other portion of the receiver, a pair of plates pivotally mounted for rotation with said shaft, springs biasing the plates together, an arm disposed between said plates, a shaft fixed at one end to the arm adjacent its center and mounted for limited rotation within the hollow shaft, pins interposed between opposite ends of said arm and plates, a disc on the other end of the last named shaft, there being angularly displaced notches in the periphery of said disc, and a pusher member disposed for movement toward said disc by one of said other cams and having an end adapted for selective engagement in said notches.

42. Apparatus as defined in claim 41 in which said angularly displaced notches are ninety degrees apart, and in which the said other cam controlling said pusher member is constructed and arranged to move the pusher member toward the disc a distance sufficient to permit the reception and discharge of the package from between said plates.

WAGNER P. THIELENS.

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